UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PREVENTION, PESTICIDES, AND TOXIC SUBSTANCES
WASHINGTON, D.C. 20460

December 4, 2001

MEMORANDUM

SUBJECT: **Oxyfluorfen:** Revised Occupational and Residential Non-Cancer and Cancer Exposure and Risk Assessments for the Reregistration Eligibility Decision (RED) Document [Case # 819447, PC Code 111601, DP Barcode D279591]

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Attached is the revised Occupational and Residential Exposure and Risk Assessment document for the Oxyfluorfen HED RED Chapter. This document was revised to correct errors found during registrant review and to add additional PPE scenarios. This assessment reflects current HED policy.

Active EPA Reg #: 4-432, 239-2622, 239-2516, 524-520, 538-172, 707-165, 707-243, 11603-29, 48234-10, 58185-27, 66222-28

PHED: Yes, Version 1.1 (August 1998, Surrogate Table)

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Occupational and Residential Executive Summary for Oxyfluorfen

Oxyfluorfen Product Descriptions, Uses and Application Methods:

Oxyfluorfen is a broad spectrum herbicide used for pre and post-emergence control of certain broadleaf and grassy weeds. Agricultural uses include control of weeds in field /row crops, orchard floors, vineyard floors, and container and field grown ornamentals. In the residential environment, it is used to kill weeds on paved surfaces such as driveways, patios and sidewalks.

The domestic usage of oxyfluorfen is estimated to be approximately 784,000 pounds active ingredient (ai) on 1.3 million acres. Major uses include grapes, almonds, cotton, bulb vegetables, artichokes and pasture/rangeland. There are currently five active emulsifiable liquid products for agricultural use and three granular products for commercial nursery use. There are three residential products which contain 0.25% to 0.70% oxyfluorfen by volume and are packaged in a Ready to Use (RTU) trigger sprayer, RTU sprinkler jug or as a liquid to be applied in a sprinkler can or hand carried tank sprayer. The application rates for the oxyfluorfen products range from 0.25 to 2.0 lbs. ai per acre per application and one or two applications are typically made in the growing season. Liquid formulations are applied using groundboom, right of way and backpack sprayers. Aerial application is used only for fallow fields and chemigation is used for primarily for bulb vegetables. Granular oxyfluorfen is applied to ornamentals with broadcast spreaders and spoons.

Several of the oxyfluorfen products also contain other registered active ingredient herbicides such as glyphosate - isopropylamine salt, Imazapyr - isopropylamine salt; Pendimethalin, Oxadiazon and oryzalin. These ingredients are not addressed in this risk assessment.

Toxicology Endpoints:

Oxyfluorfen is of low acute toxicity and is in toxicity category IV for oral, dermal and inhalation routes of exposure. It is a slight eye and skin irritant and it is not a skin sensitizer. The following endpoints were used in this assessment:

Short Term NOAEL (for dermal and inhalation exposures)	= 30 mg/kg/day
Intermediate Term LOAEL (for dermal and inhalation exposures)	= 32 mg/kg/day
Dermal Absorption Factor	= 18%
Inhalation Absorption Factor	= 100%

The target MOE includes safety factors of 10 to extrapolate from animals to humans and 10 to account for variability within humans. An additional safety factor of three is used for intermediate term exposures because the dose was derived from the LOAEL rather than the NOAEL. Oxyfluorfen is also a category C possible human carcinogen with a Q_1^* of 7.3×10^{-2} $(mg/kg/day)^{-1}$.

Occupational Handler/Applicator Exposure and Risk Estimates:

HED has determined that pesticide handlers/applicators are likely to be exposed during oxyfluorfen use and that these uses would result in short (1 to 7 days) and intermediate term (7 days to several months) exposures. Chronic exposures (more than several months) are not expected because oxyfluorfen is only applied a couple of times per year. The anticipated use patterns and current labeling indicate that there are 10 types of equipment that potentially can be used to apply oxyfluorfen. Based upon this equipment there are 7 mixing/loading scenarios, 6 application scenarios, one flagging scenario and 4 mixing/loading/applying scenarios.

Analyses for handler/applicator exposures were performed using PHED data and data from one worker exposure study (MRID 452507-01) which involved spoon application of a granular pesticide to banana plants. These calculations indicate that the MOEs for most of mixing/loading scenarios and the Right of Way application scenario are below 100 at the baseline level and are of concern. At the single layer PPE level (which includes chemical resistant gloves), all of the scenarios have MOEs of 300 or greater. The PPE requirements as listed on the labels ranges from baseline to double layer with most of the labels requiring waterproof or chemical resistant gloves. Only one of the labels (Scotts OHII) requires respiratory protection.

The cancer risks for all of the custom handler/applicator scenarios (thirty days exposure per year) are less than 1.0 e-04 with single layer PPE. With the exception of the flagging aerial spray and the loading of granules for broadcast application scenarios, all of the scenarios exceed 1.0e-06 with engineering controls. Cancer risks for all the private grower scenarios (10 days exposure per year) are less than 1.0e-04 with single layer PPE. Under certain exposure scenarios, some of private grower cancer risks exceed 1.0×10^{-6} at the engineering control level.

Post-Application Occupational Exposure and Risk Estimates:

Oxyfluorfen is a non-selective herbicide that can cause leaf damage to most of the labeled crops. For this reason, the liquid product labels specify that it should be applied to the ground in such a manner as to minimize crop damage and the granular product labels specify that it should be watered in to rinse the granules off of the foliage. With the exceptions of bulb vegetables and conifers, which have more tolerance to oxyfluorfen, over the top applications are not recommended. Based upon the above factors it was determined that re-entry workers would only have post application exposure following applications of oxyfluorfen to conifer seedlings, conifer trees and bulb vegetables.

One study (MRID 420983-01) was submitted which measured the Dislodgeable Foliar Residue (DFR) of oxyfluorfen applied to conifer seedlings. This study has serious deficiencies which include very low recovery, very high fortification levels, lack of method validation data and use of a non-standard dislodging solution. An attempt was made to account for these deficiencies by applying correction factors of 9 for the low recovery and 1.7 for the non-standard dislodging solution. Even with

these correction factors, the study data indicates faster dissipation

rates (90% for day 0 to day 1 and 37% after day 1) than the default value of 10%. Because chemical specific DFR data was not provided for bulb vegetables, the default initial deposition (20% of applied amount) and dissipation (10% per day) values were used.

The MOEs for non-cancer risks were above 300 for bulb vegetables on day zero and are not of concern for short or intermediate term exposures. The short term MOEs for conifers ranged from 93 to 280 on day zero using default values with the highest exposure task being Christmas tree shearing. The short term MOEs rise to 100 in one day. The intermediate term MOEs for conifers ranged from 32 to 350 on day zero and rise to 300 in one to ten days. If the study data is used, the day zero DFR is higher, but dissipates at a much greater rate which causes the MOEs to rise to above 300 in one to two days.

The cancer risks for commercial re-entry workers working with bulb vegetables is less than 1.0e-04 on day zero and declines to less than 1.0e-06 in 23 to 38 days. The cancer risks for working with conifers exceeds 1.0e-04 on DAT zero when using either default assumptions or study data. These risks decline to less than 1.0e-04 in 4 to 14 days when using default assumptions or 1 to 2 days when using study data. The conifer scenario risks decline to less than 1.0 e-06 in 41 to 58 days when using default assumptions and 10 to 12 days when using study data. The cancer risks for private growers working with bulb vegetables is less than 1.0e-04 on day zero and declines to less than 1.0e-06 in 12 to 28 days. The cancer risks for private growers working with conifers exceeds 1.0e-04 on day zero for only one scenario (shearing Christmas trees). This risk declines to less than 1.0e-04 in one day if study data is used and in four days if default assumptions are used. The risks for all of the conifers scenarios declines to less than 1.0e-06 in 30 to 47 days when using default assumptions and 6 to 12 days when using study data.

Residential Applicator Exposure and Risk Estimates:

The four residential exposure scenarios yielded MOEs of 4,100 to171,000 which exceeded the target MOE of 300 and are not of concern. The cancer risk for all of the scenarios was less than1.0-e06 and is not of concern.

Residential Post Application Exposure and Risk Estimates

There are no concerns of post application residential exposure because residential uses are limited to spot treatments which do not include broadcast application to lawns. In addition, the label states that oxyfluorfen kills grass.

Risk Characterization

The number of days of post application exposure per year is not known and the standard values of 10 days per year for private growers and 30 days per year for commercial workers was used as a screen. These values are probably conservative because oxyfluorfen is typically applied only a few

times per year.

It is understood that oxyfluorfen is applied to weeds in Christmas tree plantations in a semi-directed manner to reduce tree contact and that only the lower branches typically receive overspray. Therefore, the risk estimates for Christmas tree shearing are probably conservative. The typical oxyfluorfen application rate for tree rows in North Carolina is 0.375 lbs ai/acre which is less than the label rate of 1.0 to 2.0 lbs ai/acre. Oxyfluorfen is used at this rate for "chemical mowing" to inhibit weed growth while maintaining some ground cover to prevent erosion.
Additional calculations were performed using this rate and indicated that the MOEs were above 300 after one day of dissipation while the cancer risks were below 1.0 e-04 after five days of dissipation.

Incident Report:

A total of 66 incidents were reported in the OPP Incident Data System (IDS) from 1994 to 2000. Most of these incidents involved irritant effects to the eyes, skin and occasionally respiratory passages and there was no medical evidence supplied to support the finding that these effects were anything other than coincidental to oxyfluorfen exposure. There were 25 cases reported in the California Pesticide Illness Surveillance Program and the majority of these cases involved minor symptoms of systemic illness such as headache, dizziness and nausea. The incident report recommends that measures be taken to enforce the reentry interval and that skin and eye protection be worn by handlers and those who are likely to have substantial contact with oxyfluorfen.

Information and Data Needs

Several areas of this assessment would improve with the following information:

- Frequency and timing of re-entry worker post application exposures.
- Acceptable DFR data for conifers to confirm the conclusions of the submitted study which has serious deficiencies.

Data Compensation Issues

Data compensation issues need to be addressed so that the spoon application exposure data from MRID 452507-01 can be used in this assessment.

Risk Mitigation

It is recommended that occupational applicators wear at least single layer PPE to include chemical resistant gloves for dermal protection when mixing and loading oxyfluorfen . Christmas tree growers should avoid high contact activities such as shearing for several days after oxyfluorfen application, particularly if they applied at the label rates. The possibility of lowering the label rates for Christmas tree by using "chemical mowing" should be investigated.

1.0 Background Information

1.1 Purpose and Criteria for Conducting Exposure Assessments

Occupational and residential exposure and risk assessments are required for an active ingredient if: (1) certain toxicological criteria are triggered **and** (2) there is potential exposure to handlers (i.e., mixers, loaders, applicators, etc.) during use or to persons entering treated areas after application is completed. Oxyfluorfen (2-chloro-1- (3-ethoxy-4-nitrophenoxy)-4-trifluoromethylbenzene; CAS # 42874-03-3) meets both criteria. There is potential exposure to private grower and custom applicators from agricultural site applications of oxyfluorfen. In addition, the general public may be exposed to oxyfluorfen when applying it in the residential environment.

Several of the oxyfluorfen products for agricultural use also contain other registered active ingredient herbicides such as glyphosate - isopropylamine salt, Imazapyr - isopropylamine salt; Pendimethalin, Oxadiazon and oryzalin. These ingredients are not addressed in this risk assessment.

1.2 Toxicological Endpoints Used in the Exposure and Risk Assessments

The toxicological endpoints that were used to complete occupational and residential exposure assessments are summarized in Tables 1 and 2. These endpoints were selected from animal studies by the Health Effects Division Hazard Identification Assessment Review Committee (HEDs HIARC) and are discussed in detail in HED Document #014549. It should be noted that the short term endpoints were selected to protect females thus a body weight of 60 kg will be used for short term risk calculations. The HED FQPA Safety Factor Committee decided the FQPA safety factor could be reduced to 1X in assessing the risk for oxyfluorfen because there is no indication of increased susceptibility of rats or rabbits to *in utero* and/or post natal exposure (HED Document #014554). The WPS Restricted Entry Interval (REI) for oxyfluorfen is 24 hours because it is moderately toxic.

Table 1 - Acute Toxicity Categories for Oxyfluorfen

Study Type	% Test Material	Results	Toxicity Category
Acute Oral	97%	LD_{50} > 5000 mg/kg	IV
Acute Dermal	97%	LD_{50} > 5000 mg/kg	IV
Acute Inhalation	96%	LC_{50} > 3.71 mg/L	IV
Primary Eye Irritation	96%	slight irritant, negative	IV
Primary Skin Irritation	96%	slight irritant	IV
Dermal Sensitization	96%, 23%	Negative, Negative	---
Acute Neurotox	—	---	NA
Restricted Entry Interval (REI)			24 hours

Table 2 - Toxicology Endpoints for Oxyfluorfen				
EXPOSURE SCENARIO	**DOSE (mg/kg/day)**	**ENDPOINT**	**TARGET MOEc**	**STUDY**
Cancer	$Q_1^* = 7.32 \times 10^{-2}$	Combined hepatocellular adenomas and carcinomas.	N/A	Mouse carcinogenicity study
Dermal, Short-Term[a]	NOAEL= 30	Abortions and clinical signs.	100	Developmental rabbit study (1998)
Dermal, Intermediate-Term[a]	LOAEL = 32	Liver toxicity and anemia.	300[d]	90-day mouse
Dermal, Long-Term[a]	NOAEL = 3.0	Liver toxicity occurring in dogs and mice.	100	Chronic dog study and mouse carcinogenicity
Inhalation, Short-Term[b]	NOAEL = 30	Abortions and clinical signs.	100	Developmental rabbit study (1998)
Inhalation, Intermediate-Term[b]	LOAEL = 32	Liver toxicity and anemia.	300[d]	90-day mouse
Inhalation, Long-Term[b]	NOAEL = 3.0	Liver toxicity occurring in dogs and mice.	100	Chronic dog study and mouse carcinogenicity

a. An oral endpoint was used for dermal exposure: dermal absorption factor of 18% of oral exposure shall be used.
b. An oral endpoint was used for inhalation exposure: inhalation exposure assumed equivalent to oral exposure.
c. Margin of Exposure above which the risk is not of concern to HED.
d. An MOE of 300 is required because the LOAEL, rather than the NOAEL was selected for this endpoint.

1.3 Incident Report

The incident report was prepared under a separate memo by Monica Spann, M.P.H. through Jerome Blondell, PhD. of the Office of Pesticide Programs. A total of 66 incidents were reported in the OPP Incident Data System (IDS) from 1994 to 2000. Most of these incidents involved irritant effects to the eyes, skin and occasionally respiratory passages and there was no medical evidence supplied to support the finding that these effects were anything other than coincidental to oxyfluorfen exposure. There were 25 cases reported in the California Pesticide Illness Surveillance Program and the majority of these cases involved minor symptoms of systemic illness such as headache, dizziness and nausea. During one of these incidents, nine of 15 field workers developed symptoms while transplanting cauliflower plants in a field that was sprayed about 30 minutes earlier. The reentry interval required on the label was 24 hours. These illnesses included symptoms of chemical conjunctivitis, eye irritation, tingling and itching of the left thigh, nausea, dizziness, headache, and vomiting.

The incident report recommends that measures be taken to enforce the reentry interval and that skin and eye protection be worn by handlers and those who are likely to have substantial contact with oxyfluorfen.

1.4. Summary of Use Patterns, Formulations and Application Methods

Uses

Based upon the Oxyfluorfen Use Closure Memo, there are registered, supported products of oxyfluorfen intended for both occupational and residential site applications. The registered agricultural uses include control of weeds in field /row crops, orchard floors, vineyard floors, and container and field grown ornamentals. Residential homeowners may use oxyfluorfen products for spot treatment of weeds on pavement. Other types of residential applications/uses are not permitted without additional review.

Based upon available pesticide survey usage information for the years 1990-1999, the Biological and Economic Effects Division (BEAD) of EPA estimates that total annual domestic usage for applications of oxyfluorfen is approximately 743,000 pounds active ingredient (ai) for about 1.2 million acres treated. Oxyfluorfen has its largest markets, in terms of total pounds active ingredient, allocated to wine grapes (32%), almonds (23%), cotton (7%), walnuts (6%), and table grapes (4%). Crops with the highest percentage of the total U.S. planted acres treated include wine grapes (54%), artichokes (53%), pistachios (44%), almonds (43%), table grapes and nectarines (35% each) and figs (33%). Most of this usage is in California, Texas, Minnesota, New Mexico, Connecticut and Washington.

The use for Right of Way treatment is mentioned on three supplemental labels for Goal 2XL and was included in this assessment.

Mode of Action and Targets Controlled

Oxyfluorfen is a broad spectrum herbicide used in the agricultural environment for pre and post-emergence control of certain broadleaf and grassy weeds. It is has both contact activity and soil residual properties, however, it is not effective if soil is incorporated. Excellent spray coverage of the soil or weed is required for pre and post emergent control, respectively. Careful targeting of the spray is required because oxyfluorfen is non-selective and will damage crops. In the residential environment, it is used to kill weeds on paved surfaces such as driveways, patios and sidewalks and cannot be used on turf because it kill grass.

Formulation Types and Percent Active Ingredient

According to EPA OPP REFS label tracking system, there are currently 11 active products of oxyfluorfen formulated from two brands of technical grade oxyfluorfen. Oxyfluorfen is formulated for agricultural uses as an emulsifiable liquid concentrate which contains 0.2 to 2 pounds active ingredient (ai) per gallon and as a granular product which contains 2% oxyfluorfen by weight. Residential formulations contain 0.25% to 0.70% oxyfluorfen by volume and are packaged in a RTU sprinkler jug,

a RTU trigger sprayer or as a liquid to be mixed in a sprinkler can or tank sprayer.

Application Rates, Timing and Frequency of Applications

The Oxyfluorfen Use Closure Memo specifies the maximum and typical (or average) application rates for agricultural uses. The three granular products listed in Table 3A are used in commercial nurseries at an application rate of 2 lb ai/acre. The rates for the liquid products range from 0.25 to 2.0 lbs ai per acre per application and are given in Table 3B. Mon 78095 has a lower application rate than Goal or Galigan because it also contains glyphosate. Typically one or two applications are made in the growing season to prevent weed growth (pre emergent) and/or to kill small weeds (post emergent). The label required spray volumes range from 10 to 60 gallons per acre.

Table 3A - Oxyfluorfen Granular Products for Commercial Nursery Use

CROPS	Application Site	Application Rate Max Per Application/Max Per Season (lbs ai/acre)		
		OH II[1]	Rout[2]	O-O Herbicide[3]
Ornamentals, Field and Container Grown	Outside Only	2.00	2.0/8.0	2.00

Notes
1. Ornamental Herbicide II (OH II) is produced by the Scotts Company.
2. Rout is produced by the Grace/Sierra Crop Protection Company.
3. O-O Herbicide is produced by the Regal Chemical Company.

Table 3B - Oxyfluorfen Agricultural Products and Application Rates

CROPS	Application Site	Ga/Acre	Application Rate Max Per Application/Max Per Season (lbs ai/acre)		
			GOAL 2XL[1]	MON 78095[2]	GALIGAN 2E[3]
Artichoke	Rows between	40	2.0/2.0	-	2.0/2.0
Broccoli/Cabbage/Cauliflower	plants	20	0.50	0.25- 0.5	0.50
Corn (Note 4)	Before Transplant	10-30	1.25	-	1.25
Cotton	Rows between	20-40	0.50	0.0625/0.125	0.50
Garbanzo Beans (CA only)	plants	25	0.25	-	0.25
Garlic	Rows between	40	0.25/0.50	0.25- 0.5	0.12/0.50
Horseradish	plants	20	0.50	0.25- 0.5	0.50
Mint	Pre-emergence	20-40	2.00	-	2.00
Onions	Over the top	40	0.50	0.25- 0.5	0.12/0.5
Onions grown for seed	Pre-emergence	40	0.50	0.25- 0.5	0.12/0.5
Soybeans	During Dormancy	20-60	0.50/0.75	-	0.50/0.75
Strawberries (Section 18)	Over the top		0.50	-	
Taro (HI only)	Over the top Rows between plants During Dormancy Rows between plants	15	0.50/1.0		0.50/1.0
Fallow Bed	Non-crop	10-20	0.50	0.25/0.5	0.50
Right of Way[5]	Non-crop	40-100	0.5 - 2.00	-	-

Table 3B - Oxyfluorfen Agricultural Products and Application Rates					
CROPS	**Application Site**	**Ga/Acre**	**Application Rate Max Per Application/Max Per Season (lbs ai/acre)**		
			GOAL 2XL[1]	**MON 78095[2]**	**GALIGAN 2E[3]**
Cacao	Orchard Floor	15-40	2.0/6.0	-	2.0/6.0
Citrus (non-bearing trees)	Orchard Floor		2.0/4.0	0.25/0.5	2.0/4.0
Coffee (Hawaii)	Orchard Floor		2.0/6.0	-	2.0/6.0
Guava	Orchard Floor		2.0/4.0	-	2.0/4.0
Papaya(Hawaii only)	Orchard Floor		1.0/3.0	-	1.0/3.0
Treefruit/Nut	Orchard Floor		0.50/2.0	0.25/0.5	2.00
Jojoba	Base of Plant	40	2.00		2.00
Cottonwood	Tree Farm Floor	20	2.00		2.00
Eucalyptus	Tree Farm Floor		2.00		2.00
Conifer Seedbeds	Over the Top		1.00		0.5-2.0
Conifer and Deciduous Trees (Note 6)	Tree Farm Floor		2.00		0.5-2.0
Vine Crops (Grapes, Kiwi)	Vineyard Floor	40	0.50/2.0	0.25/0.5	

Notes for Table 3A
1. Produced by Rhom and Haas
2. Registered by Monsanto. Not currently produced.
3. Produced by Makhteshim-Agan
4. Used in North and South Carolina only for control of witchweed in field corn.
5. The Right of Way use is specified on GOAL 2XL supplemental labels. The higher spray volumes are required for the higher Appl rates.
6. Conifer transplants, container stock, deciduous trees grown in the field (Goal 2XL)

Three residential use products are listed in the REFS system. These products are packaged in 16 ounce to 2 gallon containers with or without a built in nozzle or trigger sprayer and are intended for spot treatment of weeds on driveways, sidewalks, patios and around trees. Residential product information is given in Table 4.

Table 4 - Residential Use Product Information for Oxyfluorfen	
Product/Company	**Formulation and Application Method**
Kleenup Super Edger/Platte Chemical Corp	Contains 0.25% oxyfluorfen in pre-mixed one pint to one gallon containers. Applied from a RTU trigger sprayer, a RTU sprinkler jug or from a tank sprayer.
Ortho GroundClear SuperEdger/ Monsanto Solaris Group	Ready to use liquid containing 0.12% oxyfluorfen. Applied directly from the jug which has an applicator spout.
Ortho GroundClear Triox Total Vegetation Killer A /Monsanto	Concentrate containing 0.70% oxyfluorfen. Mixed with water and applied from a sprinkler can.

Application Methods

Agricultural liquid formulations of oxyfluorfen are applied using large, small or ATV groundboom rigs. Aerial application is used only for fallow fields. According to the USDA Crop Profile for Christmas Trees in North Carolina, backpack sprayers are used in Christmas tree plantations. Per the Use Closure Memo, chemigation is used for over the top application to bulb vegetables and for drip

application to some orchard trees, however, chemigation is prohibited per the product labels. It is assumed that right of way sprayers are used in right of way areas. Granular oxyfluorfen is applied to field grown ornamentals with broadcast spreaders and container grown ornamentals with spoons. A listing of application methods and amounts of acreage treated per 8 hour day is included in Table 5.

Table 5 - Oxyfluorfen Application Methods		
Application Method	**Crops Treated**	**Treated Area[a]**
1 - Large Groundboom	Cotton, soybeans, garbanzo beans, corn Bulb vegetables, brassica Mint (dormant)	80-200 80 80
2 - Small Groundboom	Orchard and Vineyard Floors (almonds, coffee, grapes etc) Strawberries	80 80
3 - ATV Groundboom[b]	Artichokes (Spray Volume = 40 gallons/acre)	40
4 - Fixed Wing Aircraft	Fallow beds	350-1200
5 - Right of Way (ROW) Sprayer	Right of Way (ROW) Areas	50[c]
6 - Chemigation	Bulb Vegetables (Onions, Garlic, Horseradish)	350
7 - Backpack Sprayer	Christmas Tree Plantations	2[d]
8 - ATV Drawn Broadcast Spreader	Ornamentals, field grown and landscape	40
9 - Push Type Broadcast Spreader	Ornamentals, field grown and landscape	5
10. Spoon	Ornamentals, Container Grown	1

a. Based upon HED Exposac Policy #9 "Standard Values for Daily Acres Treated in Agriculture", Revised July 5, 2000
b. Per USDA Artichoke Crop Profile and California application data (7169 acres treated/161 applications = 45 acres/application).
c. Based upon 1000 gallons of spray applied per day divided by an estimated spray volume of 40 gallons per acre
d Based upon 40 gallons of spray applied per day divided by the label required spray volume of 20 gallons per acre

2.0 Occupational and Residential Exposures and Risks

As discussed above, oxyfluorfen is used both in the agricultural and residential environment. The risks of mixing, loading and applying oxyfluorfen in the agricultural environment are discussed in section 2.1. Post application exposures and risks for agriculture are discussed in section 2.2. Exposures and risks for homeowners (i.e., residential) are discussed in section 2.3.

2.1 Occupational Handler/Applicator Exposures & Risks

There are two populations of workers exposed to oxyfluorfen during the mixing/loading and application in the agricultural environment. These include private growers who apply oxyfluorfen only to their own farms and custom applicators who apply oxyfluorfen to multiple farms. Except as specified below, the term applicator means one who mixes, loads and applies oxyfluorfen.

2.1.1 Exposure Scenarios

Based upon the application methods shown in Table 5, the following exposure scenarios were developed. These scenarios serve as the basis for the quantitative occupational applicator exposure and risk assessments.

Application Method	Exposure Scenario
1. Large Groundboom	1A - Mix/Load Liquids - Large Groundboom
	1B - Spray Application - Large Groundboom
2. Small Groundboom	2A - Mix/Load Liquids - Small Groundboom
	2B - Spray Application - Small Groundboom
3. ATV Groundboom	3A - Mix/Load Liquids - ATV Groundboom
	3B - Spray Application - ATV Groundboom
4. Fixed Wing Aircraft	4A - Mix/Load Liquids for Aerial Application
	4B - Spray Application - Fixed-Wing Aircraft
	4C - Flag Aerial Applications
5. Chemigation	5 - Mix/Load Liquids - Chemigation
6. Right of Way (ROW) Sprayer	6A - Mix/Load Liquids - ROW Sprayer
	6B - Spray Application - ROW Sprayer
7. Backpack Sprayer	7 - Mix/Load/Apply Liquids - Backpack
8. ATV Drawn Broadcast Spreader	8A - Load Granules into ATV Broadcast Spreader
	8B - Apply Granules with ATV Broadcast Spreader
9. Push Type Broadcast Spreader	9 - Broadcast Spreader (Load/Apply)
10. Spoon	10 - Spoon Application

The occupational applicator exposure and risk calculations for the above scenarios are tabulated in Appendix B:

2.1.2 Exposure Assumptions and Data Sources

The following assumptions and factors were used in order to complete the exposure and risk assessments for occupational handlers/applicators:

- The average work day was 8 hours.
- The daily acreage treated were taken from EPA Science Advisory Council for Exposure Policy #9 "Standard Values for Daily Acres Treated in Agriculture," Revised July 5, 2000.
- Maximum application rates and daily acreage were used to evaluate non-cancer occupational risk.
- Average application rates and daily acreage were used to evaluate cancer occupational risk.

- C The supplemental label maximum application rate for right of way areas is 2.0 pounds per acre with a minimum spray volume of 40 gallons per acre.
- C A body weight of 60 kg was assumed for short term exposures because the short term endpoint relates to females 13-50 years of age.
- C A body weight of 70 kg was assumed for intermediate term exposures because the intermediate term endpoint is not gender specific.
- • A body weight of 70 kg was assumed for cancer scenarios.
- C A private grower mixes, loads and applies oxyfluorfen 10 days per year.
- C A custom applicator mixes, loads and applies oxyfluorfen 30 days per year.
- C The dermal absorption rate is 18%.
- C The inhalation absorption rate is 100%.
- C Baseline PPE includes long sleeve shirts, long pants and no gloves or respirator.
- C Single Layer PPE includes baseline PPE with gloves.
- C Double Layer PPE includes coveralls over single layer PPE
- C Double Layer PPE PF5 includes above with a PF5 respirator (ie dustmask)
- C Double Layer PPE PF10 includes above with a PF10 cartridge respirator
- C Only closed cockpit airplanes are used for aerial application.

Data Sources

The following study was used as source for spoon applicator exposure data. This study was originally submitted by the Aventis Corporation to support the registration of fipronil which is an insecticide that is used on bananas. The study was reviewed by the agency and found to be of sufficient quality for use in ethoprop risk assessment. This study is also useful for assessing exposure of applying granular oxyfluorfen to ornamentals as the spoon method of application was used to apply the insecticide to the base of banana plants.

Ethoprop - Review of fipronil granular mixer/loader/applicator study (MRID 452507-01) in bananas as a source of surrogate data and accompanying ethoprop risk assessment [Case #818841, PC Code 041101, DP Barcode D270065]

This study was originally reviewed in the Ethoprop ORE chapter so that it could be used as a source of surrogate data to evaluate the risks of spoon application of ethoprop to banana plants. A total of 10 loader/applicator events during spoon application of fipronil to bananas were monitored during two different days in June, 1994 on the same banana plantation in Cameroon. Weather was typical of the application season in that it was hot and humid. Monitoring was completed using whole body dosimeters, cotton gloves, cotton caps, and personal sampling pumps equipped with filters. The fipronil product was supplied in 22 pound boxes which were loaded directly into buckets for the spoon applicators. The application rate in this study is 7.5 grams of product per plant (i.e., 0.15 grams ai/plant) which is equivalent to about 0.26 lb ai/acre (0.00033 lb ai/plant) at approximately 800 plants per acre. The numbers of acres treated ranged from approximately 0.75 to 1 acre. The pounds of

active ingredient handled ranged from about a quarter to half a pound per replicate. PVC gloves were also worn over cotton gloves which served as the dosimeters. A protection factor of 50 percent was used by the Agency to calculate exposure levels under a layer of normal work clothing.

Analysis of fipronil residues was completed with gas chromatography and electron capture detection. Field recovery data were generated in a manner that addressed field sampling, field storage, transport, laboratory storage, and analysis. Residues were corrected for the overall average field recovery for each residue/matrix combination. Generally, recovery was adequate for all media/residue combinations (i.e., all correction factors were greater than 85 percent). If the PHED grading criteria are applied all residue/matrix combinations are considered grade "A" data. The grade "A" criteria require laboratory recovery data with an average of at least 90 percent and a coefficient of variation of 15 or less accompanied with field recoveries that are at least 70 percent but not exceeding 120 percent.

The unit exposure values listed in Table 6 were calculated and normalized by the amount of chemical used. The values are based on a 50 percent clothing penetration factor and represent single layer PPE. Shapiro and Wilks testing (see reference19**)** indicated that the data underlying the unit exposures is lognormally distributed, therefore the geometric mean will be used for risk assessment purposes per Agency policy.

Table 6 - Unit Exposure Values For Spoon Application (Single Layer PPE)

Route	Exposure (mg exposure/lb ai handled)					
	Arith. Mean	Geo. Mean	Median	90^{th} Percentile	95^{th} Percentile	99^{th} Percentile
Dermal	2.9	2.0	1.9	6.1	7.3	8.2
Inhalation	0.11	0.045	0.039	0.32	0.40	0.47

PHED Exposure Analysis

With the exception of the spoon application scenario described above, exposure analyses were performed using the above assumptions in conjunction with (PHED).

The Pesticide Handlers Exposure Database (PHED) was designed by a task force of representatives from the US EPA, Health Canada, the California Department of Pesticide Regulation, and member companies of the American Crop Protection Association. PHED is a software system consisting of two parts – a database of measured exposure values for workers involved in the handling of pesticides under actual field conditions and a set of computer algorithms used to subset and statistically summarize the selected data. Currently, the database contains values for over 1,700 monitored individuals (i.e., replicates).

Users select criteria to subset the PHED database to reflect the exposure scenario being evaluated. The subsetting algorithms in PHED are based upon the central assumption that the magnitude of handler

exposures to pesticides are primarily a function of task (e.g., mixing/loading/applying), formulation type (e.g., wettable powders, granulars), application method (e.g., aerial, groundboom), and levels of personal protective clothing worn by the private grower and custom pesticide applicator (e.g., gloves, double layer of clothing).

Once the data for a given exposure scenario have been selected, the data are normalized (i.e., divided by) by the amount of pesticide handled resulting in standard unit exposures (milligrams of exposure per pound of active ingredient handled). Following normalization, the data are statistically summarized. The distribution of exposure values for each body part (e.g., chest, upper arm) is categorized as normal, lognormal, or "other" (i.e., neither normal nor lognormal). A central tendency value is then selected from the distribution of the exposure values for each body part. These values are the arithmetic mean for normal distributions, the geometric mean for lognormal distributions, and the median for all "other" distributions. Once selected, the central tendency values for each body part are composited into a "best fit" exposure value representing the entire body.

The unit exposure values calculated by PHED generally range from the geometric mean to the median of the selected data set. To add consistency and quality control to the values produced from this system, the PHED Task Force has evaluated all data within the system and has developed a set of grading criteria to characterize the quality of the original study data. The assessment of data quality is based upon the number of observations and the available quality control data. These evaluation criteria and the caveats specific to each exposure scenario are summarized in Table B1 of Appendix B. While data from PHED provide the best available information on handler exposures, it should be noted that some aspects of the included studies (e.g., duration, acres treated, pounds of active ingredient handled) may not accurately represent labeled uses in all cases. HED has developed a series of tables of standard unit exposures for many occupational scenarios that can be used to ensure consistency in exposure assessments.

Unit exposure values were calculated in PHED using the following protection factors for PPE: double layer of clothing = 50% PF for dermal exposure to the body, chemically resistant gloves 90% PF for dermal exposure to the hands, dust mask 80% PF for inhalation exposure and half face cartridge respirator = 90% PF for inhalation. Engineering controls are assigned a protection factor of 90% to 98% depending upon the type of engineering controls selected.

2.1.3 Exposure and Risk Estimates for Non-Cancer Effects

Calculation Methodology and Equations

Daily dermal and inhalation exposures are calculated as described in Appendix A. The basic rationale for these calculations is that the daily exposure is the product of the amount of ai handled per day times a unit exposure value.

The combined dose for oxyfluorfen is the sum of the absorbed dermal and inhalation doses and is used to calculate the Margin of Exposure (MOE) as follows:

MOE (unitless) = NOAEL (mg/kg bw/day) / Combined Dose (mg/kg bw/day)

The target MOEs are 100 for short term exposures and 300 for intermediate term exposures. Scenarios with MOEs greater than the target MOEs are not of concern for the occupational population.

Results and Comparison to Target MOE

Table 7 summarizes the ranges of the combined MOEs for the various exposure scenarios.

Table 7. Non-Cancer Combined MOEs for Occupational Exposure to Oxyfluorfen

Endpoint	Baseline MOEs	Single Layer MOEs
Short Term	5.7 - 7500	490 - 9000
Intermediate Term	7.1 - 9400	520 - 9600

A brief summary of the specific exposure scenarios with risks of concern (i.e. combined MOEs less than 100 or 300) is presented in Table 8. A more complete tabulation of the calculations is presented in Tables B3 and B5 of Appendix B.

Table 8 - Oxyfluorfen Handler Exposure Scenarios of Concern[a]

Mitigation Level	Scenarios of Concern (MOE = Short Term, Intermediate Term)
Baseline PPE	1A - Mix/load liquids - Large Groundboom (MOE =9, 11) 2A - Mix/load liquids - Small Groundboom (MOE = 22, 27) 3A - Mix/load liquids - ATV Groundboom (MOE = 43, 54) 4A - Mix/load liquids - Aerial (MOE = 6, 7) 5 - Mix/load liquids - Chemigation (MOE =20, 24) 6A - Mix/load liquids - Right of Way Sprayer (MOE = 69, 86) 6B - Spray Application - Right of Way (MOE = 150, 190)
Single Layer PPE (without respirators)	None

a. Scenarios are of concern when the MOE <100 for short term exposures or the MOE <300 for intermediate term exposures

Scenarios of Concern With PPE to Mitigate Risks

The calculations of occupational handler/applicator risk indicate that, at the single layer PPE level (which includes chemical resistant gloves, but does not include respiratory protection) none of the scenarios are of concern for short or intermediate term non-cancer risks.

2.1.4 Occupational Applicator Exposure and Risk Estimates for Cancer

The HED Cancer Peer Review Committee determined oxyfluorfen to be a category C possible human carcinogen (limited evidence of carcinogenicity in animals with an absence of human data) and calculated a potency value or Q_1* of 7.3 x 10^{-2} $(mg/kg/day)^{-1}$. Cancer risks of less than 1.0 X 10^{-4} (one in ten thousand) for the occupational population and less than 1 x 10^{-6} (one in a million) for the general population do not exceed the Agency's level of concern. As discussed in the Barolo Memo of 8/15/96, the Agency closely examines occupational cancer risks in the 1 x 10^{-4} to 1 x 10^{-6} range and seeks ways to reduce occupational cancer risks to the greatest extent feasible, preferably 10^{-6} or less. When this approach is used, the implicit assumptions are that any exposure will lead to some level of risk and that risk is directly and linearly proportional to exposure, regardless of the dosing schedule.

Average daily doses for cancer risk assessments are calculated as described for non-cancer risk assessment (see Appendix A) except that the average application rates and acres treated per day are used instead or the maximum rates. Once the average daily dose is calculated, a Lifetime Average Daily Dose (LADD) can be calculated. To obtain the cancer risk associated with a specific exposure scenario, the LADD is multiplied by Q_1*.

Lifetime Average Daily Dose (LADD) is calculated:

LADD = Combined Dose x (# days worked/365 days per year) x (35 years worked/70 year lifetime)
(mg/kg/day) (mg/kg/day)

[Note: The number of days worked is assumed to be 30 for custom applicators and 10 for private growers.]

Cancer Risk is calculated:

Cancer Risk = LADD (mg/kg/day) x Q_1^* $(mg/kg/day)^{-1}$

Cancer Results

The cancer risks were calculated starting with the lowest PPE level (single layer) that achieved MOEs above 100 for non-cancer risks. The overall results of cancer risk calculations for private growers and customer handlers/applicators are summarized in Table 9. Scenarios of concern where the cancer risk exceed 1.0 e-04 are listed in Table 10 for custom applicators and in Table 11 for private growers. A more detailed tabulation of the calculations is provided in Appendix B.

Table 9. Cancer Risks for Private Grower and Custom Handlers and Applicators					
	Single Layer PPE	**Double Layer**	**Double Layer PF5**	**Double Layer PF10**	**Engineering Controls**
Private grower	1.4 e-06 to 1.7 e-05	1.1e-06 to 1.0e-05	5.3e-07 to 9.7e-05	4.3e-07 to 9.3e-06	3.7e-08 to 2.0e-06
Custom Applicator	3.6 e-06 to 8.0 e -05	3.4e-06 to 6.0e-05	1.6e-06 to 5.7e-05	1.3e-06 to 5.7e-05	1.1e-07 to 6.1e-06

The cancer risks for all of the custom applicator scenarios are less than 1.0e-04 at the single layer PPE level and some of the applicator scenarios are less than 1.0e-05. At the highest level of mitigation (engineering controls) the risks for all of the custom applicator scenarios are reduced to less than 1.0 e-05 and some are reduced to less than 1.0e-06.

Table 10 - Custom Handler/Applicator Cancer Risks		
Mitigation Level	Scenarios That Exceed 1.0e-05	Scenarios That Exceed 1.0e-06
Single Layer PPE	1A, 1B, 2A, 2B, 4A, 5, 6B, 7, 9, 10	All
Double Layer	1A, 2A, 4A, 5, 6B, 7, 9	All
Double Layer PF5	Same as above	All
Double Layer PF10	Same as above	All
Engineering Controls	None	All Except 4C, 8A ,8B

Scenario Descriptions

(1) Large Groundboom: 1A - Mix/Load Liquids, 1B - Apply
(2) Small Groundboom: 2A - Mix/Load Liquids, 2B - Apply
(3) ATV Groundboom: 3A - Mix/Load Liquids, 3B - Apply
(4) Fixed Wing Aircraft: 4A - Mix/Load Liquids, 4B - Apply, 4C - Flag
(5) Chemigation: Mix/Load Liquids
(6) Right of Way Sprayer: (6A) - Mix/Load, (6B) - Apply
(7) Backpack: Mix/Load/Apply
(8) ATV Broadcast Spreader: 8A - Load Granules, 8B- Apply Granules
(9) Push Type Broadcast Spreader: Load/Apply
(10) Spoon Application

The cancer risks for all of the private grower scenarios are less than 1.0e-04 at the single layer PPE level. Higher levels of PPE reduce the risk to less than 1.0 e-05 for most of the scenarios and engineering controls reduce the risk to less than 1.0e-05 (and in some cases 1.0e-06) for all of the scenarios.

Table 11 - Private Grower Handler/Applicator Cancer Risks		
Mitigation Level	Scenarios That Exceed 1.0e-05	Scenarios That Exceed 1.0e-06
Single Layer PPE	7, 9	All
Double Layer	None	All
Double Layer PF5	None	All Except 8A and 8B
Double Layer PF10	None	All Except 8A and 8B
Engineering Controls	None	All except 3A,3B,8A,8B

Scenario Descriptions

(3) ATV Groundboom: 3A - Mix/Load Liquids, 3B - Spray Application
(7) Backpack: Mix/Load/Apply
(8) ATV Broadcast Spreader: 8A - Load Granules, 8B- Apply Granules
(9) Push Type Broadcast Spreader: Load/Apply

2.2 Post Application Re-entry Worker Exposure and Risks

Post application oxyfluorfen exposures can occur in the agricultural environment when workers enter fields recently treated with oxyfluorfen to conduct tasks such as scouting, irrigation and thinning. A private grower is defined as a single grower or employee who only enters fields owned by that particular grower while a commercial worker may enter fields owned by multiple growers.

2.2.1 Exposure Scenarios

Oxyfluorfen is a non-selective herbicide that can cause leaf damage to most of the labeled crops. For this reason, the liquid product labels specify that it should be applied to the ground in such a manner as to minimize crop damage and the granular product labels specify that it should be watered in to rinse the granules off of the foliage. With the exceptions of bulb vegetables and conifers, which have more tolerance to oxyfluorfen, over the top applications are not recommended. Re-entry workers may be exposed to oxyfluorfen during a variety of agricultural scenarios listed in Table 12 for some of the crops treated with oxyfluorfen. Because oxyfluorfen is typically applied only a few times per season and because the agricultural scenarios occur for only a few months per year, it was determined that oxyfluorfen exposures would be in the range covered by the short and intermediate term toxicological endpoints. Potential inhalation exposures are not anticipated for the post-application worker scenarios because of the low vapor pressure of oxyfluorfen (2.0e-07 torr at 20 C), and the Agency currently has no policy/method for evaluating non-dietary ingestion by workers due to poor hygiene practices or smoking. As a result, only dermal exposures were evaluated in the post-application worker assessment.

In the Worker Protection Standard (WPS) a restricted entry interval (REI) is defined as the duration of time which must elapse before residues decline to a level so entry into a previously treated area and engaging in a specific task or activity would not result in exposures which are of concern. The restricted entry interval for oxyfluorfen is currently set at 24 hours.

2.2.2 - Exposure Data Sources, Assumptions and Transfer Coefficients

Data Sources:

The following chemical specific Dislodgeable Foliar Residue (DFR) study for post application worker exposure was submitted by Rhom and Haas:

MRID 420983-01 *Persistence of Dislodgeable Residues Under Tree Nursery Conditions (MS Thesis)* J.H. Massey, University of Arkansas, January 1990

This study measured dislodgeable foliar residues following groundboom application of oxyfluorfen (Goal) to control weeds in conifer seedling beds. One part of the study measured DFR for two weeks after application and the other part measured DFR at random periods throughout the growing season**.** The two week study was conducted at the Ashe nursery in Mississippi and at the Phipps nursery in Oregon. The season long study was also conducted at Ashe Nursery. One application was made at each nursery with an application rate of 0.13 lb/ai/acre. There were four loblolly seedling beds at Ashe and three ponderosa pine seedling beds at Phipps. Background samples were taken from one of the beds at each nursery prior to application.

There were 31 time periods sampled at Ashe and 27 time periods sampled at Phipps with many sampled during the first 24 hours. Four replicates per time period were collected at Ashe Nursery while five replicates were collected at Phipps nursery and each replicate consisted of one seedling. The seedlings were immediately weighed and the residues were dislodged in a glass jar filled with 150 water by shaking vigorously for 45 seconds. After shaking, the seedling was removed from the jar and the rinse water was extracted with 10 ml chloroform or hexane. The solvent extracts were analyzed for Oxyfluorfen using gas chromatography with a limit of detection (LOD) of 0.40 ug/sample. The cumulative surface area (CSA) per sample was determined from the regression equation: CSA = 34*SFW + 67.9 where SFW equals seedling fresh weight. This equation had been derived prior to the study by measuring needle length, needle volume, and seedling weight for six to 12 seedlings of each species studied. The SFW in grams was 7.14 $\pm$ 2.05 for the loblolly seedling samples at Ashe and 15.67 $\pm$ 6.00 for the ponderosa pine seedling samples at Phipps.

Seedling samples for the two week study were field fortified by adding a known amount of oxyfluorfen to a glass jar containing 150 ml of tap water to create a 1.0 PPM solution for Ashe Nursery or 3.75 PPM solution for Phipps nursery. The average field recovery for Ashe Nursery (n=13) was 103.4 $\pm$ 13.1. The average recovery for Phipps nursery (n=23) was 91.6 $\pm$ 14.7. The fortification

levels in terms of needle area were 0.48 ug/cm^2 for Ashe and 0.94 ug/cm^2 for Phipps.

Seedling samples during the season long study were field fortified during every other sampling period with eight pesticides (atrazine, DCPA, diphenamid, glyphosate, napropamide, oxyfluorfen, sethoxydim and simazine). This was accomplished by adding 5 ml of a solution that contained 10 ppm of the pesticides to a 125 l jar of water. This equates to approximately 50 ug oxyfluorfen per sample and the average recovery for oxyfluorfen was 11%.

The initial values for the two week study were 0.022 $\pm$ 0.017 ug/cm^2 at Ashe and 0.064 $\pm$ 0.023 ug/cm^2 at Phipps. These values were corrected by a factor of 1.7 (measured during the study) to account for the use of water instead of surfactant solution and divided by a factor of 0.11 to account for low recovery measured during the season long study. The corrected values were 0.34 ug/cm^2 for Ashe and 0.98 ug/cm^2 for Phipps. Oxyfluorfen residues declined at a rapid rate during the first 24 hours then at slower rate to the LOD during the remainder of the study period. Agency regression analysis of the first 11 time periods (day 0 to day 1) for the Ashe Nursery data yielded a half life of 0.36 days (R^2 = 0.76) and a half life of 2.0 days (R^2 = 0.51) for the following 12 time periods (day 1 to day 3). Regression analysis of the first 13 time periods (day 0 to day 1) for the Phipps Nursery data yielded a half life of 0.44 days (R^2 = 0.83) and a half life of 1.5 days (R^2 = 0.96) for the following 13 time periods (day 1 to day 5) .

This study is of marginally sufficient quality to be used for exposure and risk assessment purposes. The lack of validation data, high fortification levels and low recovery during the season long study are the most significant deficiencies. Given these deficiencies, the following adjustments will be made to this data for use in oxyfluorfen post application exposure assessments:

1. A factor of 1.7 will be applied to the data to account for the use of water instead of surfactant as the dislodging solution..

2. An additional factor of 9.1 will be applied to the data to account for the low field recovery (11%) measured during the season long study.

3. Only the Phipps data will be used to estimate the dissipation rate because they have a higher initial value and better correlation than the Ashe data. The estimated dissipation rates are 90% for the first day and 37% for subsequent days.

Assumptions

The following assumptions were made regarding post application occupational exposure:

- Non-Cancer risks were assessed using the maximum label rates.
- Cancer risks were assessed using the average application rates.
- The risks for conifer trees was also assessed at the rate (0.375 lb ai/acre) which used for "chemical mowing" on Christmas trees in North Carolina.
- A private grower would work at a single farm and have ten days of post application exposure per year.
- A commercial re-entry worker would work at multiple farms and have thirty days of post application exposure per year.
- With the exception of conifers and bulb vegetables, applications would be made in such a way as to minimize contact with crop foliage. These factors are listed in Table 12.
- The initial percent of application rate as Dislodgeable Foliar Residue (DFR) was assumed to be 20% for bulb vegetables and the dissipation rate per day was assumed to be 10%. These are the standard values used in the absence of chemical specific data.
- The initial percent DFR for conifers was assumed to be either the standard value (20%) or the adjusted study value (69%) from MRID *420983-01*.
- The dissipation rate per day for conifers was assumed to be either the standard value (10%) or the study values (90% for day zero to day 1, 37% after day 1).

Transfer Coefficients

The transfer coefficients used in this assessment are from an interim transfer coefficient policy developed by HED's Science Advisory Council for Exposure using proprietary data from the Agricultural Re-entry Task Force (ARTF) database (policy # 3.1). It is the intention of HED's Science Advisory Council for Exposure that this policy will be periodically updated to incorporate additional information about agricultural practices in crops and new data on transfer coefficients. Much of this information will originate from exposure studies currently being conducted by the ARTF, from further analysis of studies already submitted to the Agency, and from studies in the published scientific literature. These coefficients range from 300 for low contact activities such as scouting, irrigating and thinning immature fields of bulb vegetables to 3000 for higher contact activities such as shearing Christmas trees. The exact transfer coefficient for a given scenario also depends upon the crop height and foliage development. Currently there are no transfer coefficients for conifer seedlings or nursery plants listed in policy #3.1 and a value of ~1000 cm^2/hr was chosen for conifer seedling irrigation/scouting based upon professional judgement, transfer coefficients for similar activities on other low crops and preliminary ARTF data that is being collected for a variety of crops to include nursery plants. The risks calculated for conifer seedlings should be considered semi-quantitative until the ARTF data has been reviewed.

The issue of dermal exposure from pesticide treated soil is discussed in Policy #3.1 and currently

the agency has no methods for assessing these exposures.

Table 12 - Post Application Exposure Scenarios and Transfer Coefficients		
Crop Type (Specific Crops)	**Post Application Exposure Scenarios**	**Transfer Coefficient (cm^2/hr)**
Berry, Low (Strawberries)	None - Applied to ground between rows prevent crop leaf contact	N/A
Field row crop, low/medium (Soybeans, Garbanzo beans, Cotton, Mint)	None - Applied to mint during dormant season and to garbanzo beans pre-emergence (crop and weed). Applied to cotton fields using branch lifters or shields to prevent contact with crop. Applied to soybean fields using flat fan nozzles positioned to prevent crop contact.	N/A
Field Corn	None - Spray is directed to base of corn plant to prevent leaf contact and injury.	N/A
Ornamentals (Cut Flowers)	None - Applied when leaves are dry and watered in to remove granules from leaves.	N/A
Trees, Deciduous and Citrus - Non-Bearing (Citrus, Apples, peaches pears etc)	None - Applied to orchard floor to avoid contact with leaves or green bark.	N/A
Trees, Conifer Seedlings (Can be applied over the top as conifer seedlings more than five weeks old are resistant to oxyfluorfen)	Irrigation, scouting, hand weeding escaped weeds	1000
Trees, Conifers	Irrigation, scouting Shearing	1000 3000
Tree Nut/Bean (Almonds, Coffee)	None - Applied after harvest to orchard floors	N/A
Bulb Vegetables (Garlic, Onions, Taro)	Irrigation, scouting, weeding, thinning immature plants Same as above with mature plants	300 1500
Brassica (Broccoli, Cabbage, Cauliflower)	Could not be assessed - Applied to soil prior to transplanting. Transplants have to be inserted with minimal soil disturbance to maintain herbicidal activity. The Agency currently has no method for assessing dermal exposures from soil.	N/A
Artichoke	None - Applied to winter irrigation ditches or to bed furrows and shoulders at layby (see USDA Crop Profile)	N/A
Vine, Trellis (Grapes, Kiwi)	None - Applied to vineyard floors to avoid plant contact.	N/A

Calculation Methodology for Post Application Exposures

The calculations used to estimate the exposures for the post-application scenarios are similar to those described previously for the handler/applicator scenarios and are described in Appendix A. Daily dermal exposure is calculated by multiplying the residue level (ug/cm^2 of leaf area) times a transfer coefficient (amount of leaf area contacted per unit time). Inhalation exposures were not calculated for the post-application scenarios because inhalation exposures have been shown to account for a negligible percentage of the overall body burden. This is particularly true for oxyfluorfen which has a very low vapor pressure (2.0 e-07 torr at 20 C).

2.2.3 - Exposure and Risk Estimates for Non-Cancer Effects

Estimated occupational post-application exposures and non-cancer risks were calculated and detailed results are presented in Appendix C. The length of time for the risks to decline to levels that are not of concern (i.e., the MOEs rise to 300) were also calculated and are included in Table 13. Only the length of time for Christmas tree shearing is longer than the restricted entry interval (REI) of 24 hours when using default assumptions. If the study data is used, the day zero DFR is higher, but dissipates at a much greater rate which causes the MOEs to rise to above 300 by DAT one for the highest exposure scenario (Christmas tree shearing). If the lower application rate for chemical mowing is used, the MOEs rise to above 300 by DAT 1 with both default assumptions and study data.

Table 13 - Oxyfluorfen Post Application Non-Cancer Risks

Crops	Application Rate	Input Values	Post Application Activities	DAT When ST MOE >100	DAT Where IT MOE >300
Bulb Vegetables	0.5	Default	Irrigation, scouting, weeding, thinning immature plants Irrigation and scouting mature plants	0 0	0 0
Conifer Seedlings	1.0	Default	Irrigation, scouting, hand weeding escaped weeds	0	0
Conifer Seedlings	1.0	Study Data	Irrigation, scouting, hand weeding escaped weeds	0	1
Conifer Trees	2.0	Default	Irrigation, scouting Shearing (ST, IT MOE = 110, 120 on DAT zero)	0 1	0 10
Conifer Trees	0.375	Default	Irrigation, scouting Shearing	0 0	0 0
Conifer Trees	2.0	Study Data	Irrigation, scouting Shearing	1 1	1 1
Conifer Trees	0.375	Study Data	Irrigation, scouting Shearing	0 0	0 1

*DAT = Day after treatment, ST = short term, IT = intermediate term

2.2.4 - Exposure and Risk Estimates for Cancer

A summary of the cancer risks for commercial re-entry workers is presented in Table 14 and the risks for conifer tree activities exceed 1.0e-04 on DAT zero when using either default assumptions or study data. These risks decline to less than 1.0e-04 in 4 to 14 days when using default assumptions or 1 to 2 days when using study data. If the "Chemical Mowing" application rate is used, the cancer risk for Christmas tree shearing declines to less than 1.0e-04 on DAT 5 when default data is used or on DAT 1 if study data is used. All of the scenarios have cancer risks in excess of 1.0e-06 on day zero and the time for these risks to decline to 1.0 e-06 ranges from 23 to 58 days when using default

assumptions and 8 to 12 days when using study data.

Table 14 - Post Application Cancer Risks for Commercial Workers					
Crops	Assumptions Used	Application Rate (lbs ai/acre)	Activities (Cancer Risk on Day Zero After Treatment)	DAT When Cancer Risk is Less Than:	
				1.0e-04	1.0e-06
Tree Seedlings, Conifer	Default	0.5	Irrigation, Scouting, Hand Weeding (6.9e-05)	0	41
Tree Seedlings, Conifer	Study Data	0.5	Irrigation, Scouting, Hand Weeding (2.4e-04)	1	11
Trees, Conifer	Default	1.0	Irrigation, Scouting (1.4e-04) Shearing (4.2e-04)	4 14	47 58
Trees, Conifer	Default	0.375	Irrigation, Scouting (5.2e-05) Shearing (1.6e-04)	0 5	38 48
Trees, Conifer	Study Data	1.0	Irrigation, Scouting (4.8e-04) Shearing (1.4e-03)	1 2	10 12
Trees, Conifer	Study Data	0.375	Irrigation, Scouting (1.8e-04) Shearing (5.4e-04)	1 1	8 10
Bulb Vegetables	Default	0.25	Irrigate and scout immature plants (2.1e-05) Irrigate and scout mature plants (1.0e-04)	0 0	23 38

Cancer risks for private growers are summarized in Table 15 and the Christmas tree shearing scenario exceeds 1.0e-04 on day zero when using either default assumptions or study data. These risks decline to less than 1.0e-06 in 12 to 47 days when using default data and 6 to 12 days when using study data. If the "Chemical Mowing" application rate is used, the cancer risk for Christmas tree shearing is less than less than 1.0e-04 when default data is used or declines to less than 1.0e-04 on DAT 1 if study data is used. The equations used in these calculations and a more detailed listing of the results are contained in Appendix C.

Table 15 - Post Application Cancer Risk Summary for Private Growers					
Crops	Assumptions	Application Rate (lbs ai/acre)	Activity (Cancer Risk on Day Zero After Treatment)	DAT When Cancer Risk is Less Than:	
				1.0e-04	1.0e-06
Tree Seedlings, Conifer	Default	0.5	Irrigation, Scouting, Hand Weeding (2.3e-05)	0	30
Tree Seedlings, Conifer	Study Data	0.5	Irrigation, Scouting, Hand Weeding (7.9e-05)	0	6
Trees, Conifer	Default	1.0	Irrigation, Scouting, Hand Weeding (4.6e-05) Shearing (1.4e-04)	0 4	37 47

Trees, Conifer	Default	0.375	Irrigation, Scouting, Hand Weeding (1.7e-05) Shearing (5.2e-05)	0 0	28 38
Trees, Conifer	Study Data	1.0	Irrigation, Scouting, Hand Weeding (1..6e-04) Shearing (4.8e-04)	1 1	7 12
Trees, Conifer	Study Data	0.375	Irrigation, Scouting, Hand Weeding (6.0e-05) Shearing (1.8e-04)	0 1	5 8
Bulb Vegetables	Default	0.25	Irrigate and scout immature plants (6.9e-06) Irrigate and scout mature plants (3.5e-05)	0 0	12 28

2.3 - Residential Applicator Exposure and Risks

Oxyfluorfen is used in the residential environment by homeowners to kill weeds on patios, driveways and similar surfaces. The exposures and risks from these uses is discussed below.

2.3.1 - Scenarios, Data Sources and Assumptions

Scenarios

HED has determined from residential use patterns and current labeling that residential pesticide applicators are likely to be exposed during oxyfluorfen use as a spot treatment to kill weeds and that this use would result in short-term exposures. The following scenarios will serve as the basis for the quantitative exposure and risk assessments:

- (1) Spot Treat Weeds Using a Low Pressure Tank Sprayer
- (2) Spot Treat Weeds Using a "Mix Your Own" Sprinkler Can
- (3) Spot Treat Weeds Using a RTU Invert Sprayer
- (4) Spot Treat Weeds Using a RTU Trigger Sprayer

Data Sources

Exposure data for scenarios #1 and #4 were taken from the following study which was submitted by Aventis Corp. in support of the reregistration of carbaryl:

- **Carbaryl Mixer/Loader/Applicator Exposure Study during Application of RP-2 Liquid (21%) Sevin (r) Ready to Use Insect Spray or Sevin 10 Dust to Home Garden Vegetables.** Agrisearch Study No. 1519. EPA MRID 444598-01. Report dated August 22, 1998, Author; Thomas C. Mester, PhD., Sponser: Rhone Poulenc Ag Company

This study involved low pressure handwand and RTU trigger sprayer application of Sevin(r) which contains 21% carbaryl to home vegetable plants. Applications were made by volunteers to two 18 foot rows of tomatoes and one 18 four foot row of cucumbers at a test field in Florida. A total of 40 replicates were conducted. Latex gloves were worn for twenty of the replicates and no gloves were worn for the other twenty replicates. Each replicate opened the end use product and applied it to the

vegetable rows, after which the dosimeters were collected. Inhalation exposure was monitored in the breathing zone with personal air sampling pumps and OVS sampling tubes. Dermal exposure was monitered by the extraction of carbaryl from inner and outer cotton full body dosimeters, face neck wipes, and glove and hand washes.

The average field fortification recoveries for the full body dosimeters were 84.3% for the inner and 77.7 % for the outer. Face/neck wipe field recoveries were 84.8% and handwash and OVS tube field recoveries were greater than 90 %. Laboratory method validation for each sampling matrix fell within the acceptable range of 70 % to 120%. The limit of quantitation (LOQ) was 1.0 ug/sample for all media except the OVS tubes where the LOQ was 0.01 ug/sample.

Dermal exposure was determined by adding the values from the bare hand rinses, face/neck wipes, outer dosimeter lower legs and arms, inner dosimeter torso and inner dosimeter upper legs and upper arms. This accounts for the residential applicator wearing a short sleeved shirt and short pants. The unit exposures are presented in Table 16.

Table 16 - Unit Exposure Values For Trigger and Pump Sprayer Application (MRID 444598-01)

Scenario	Dermal Unit Exposure (mg/lb ai handled)			Inhalation Unit Exposure (ug/lb ai handled)		
	Average	Geo. Mean	Median	Average	Geo. Mean	Median
Trigger Sprayer	80	53	53	0.096	0.067	0.034
Hand Held Pump Sprayer	56	38	35	0.012	0.030	0.011

Surrogate exposure data for scenarios #2 and #3 were derived from an Outdoor Residential Exposure Task Force (ORETF) proprietary study (OMA004) that was conducted during the application of an emulsifiable concentrate of diazinon to lawns using "Mix Your Own" and Ready to Use" hose end sprayers. This study was initially reviewed by Health Canada and is Summarized in an HED Secondary Review (Document #D261948 of April 30, 2001). The study was found to be acceptable with high quality data.

Assumptions regarding Residential Applicators

- The oxyfluorfen products are used for spot treatment only, they are not used for broadcast treatment of lawns because they kill grass.
- Clothing would consist of a short-sleeved shirt, short pants and no gloves.
- An area of 200 SF would be treated per application using one gallon of the "ready to use" product or 2.67 quarts of the "mix your own" product in an invert jug or sprinkler can.
- An area of 300 SF would be treated per application using one gallon of Kleenup Super Edger in a low pressure hand carried tank sprayer.
- Two applications would be made per year.
- Applicators would have 50 years of potential exposure over a 70 year lifespan.

2.3.2 Exposure and Risk Estimates for Non-Cancer Effects

The residential exposure scenarios yielded the following MOEs which exceeded the target MOE of 100 and are not of concern:

Scenario	MOE
1 - Spot Treat Weeds Using Low Pressure Tank Sprayer	12000
2 - Spot Treat Weeds Using a “Mix Your Own” Sprinkler Can	22000
3 - Spot Treat Weeds Using a RTU Invert Sprayer	170000
4 - Spot Treat Weeds Using a RTU Trigger Pump Sprayer	8500

2.3.3 Exposure and Risk Estimates for Cancer

The residential exposure scenarios yielded the cancer risks listed below. These risks are not of concern because they are less than 1.0e-06.

Scenario	Cancer Risk
1 - Spot Treat Weeds Using Low Pressure Tank Sprayer	6.2e-07
2 - Spot Treat Weeds Using a "Mix Your Own" Sprinkler Can	3.3e-07
3 - Spot Treat Weeds Using a RTU Invert Sprayer	4.3e-08
4 - Spot Treat Weeds Using a RTU Trigger Sprayer	8.7e-07

It should be noted that cancer risk is calculated on an annual basis and does not depend upon the amount used in any one day. Thus the cancer risk will be same as listed above providing that no more than two gallons of the "ready to use" or 5.3 quarts of the "mix your own" product are used per year.

2.4 - Residential Post Application Exposure and Risks

Post application residential exposures were not quantified because residential uses are limited to spot treatments which do not include broadcast application to lawns. In addition, the label states that oxyfluorfen kills grass. Although there is the possibility that exposures could occur on a treated brick patio or other treated areas, these exposures would be minimized by the fact that the spray would be absorbed into the surface.

3.0 - Occupational Risk Characterization

Several general issues must be considered when interpreting the results of this exposure assessment. These include:

- The unit exposure values are based upon measures of central tendency such as the geometric and arithmetic mean. Maximum application rates as listed on the labels were used for non-cancer risk estimates and average application rates were used for cancer risk estimates. The daily acres treated are high end values for non-cancer risk estimates and average values for cancer risk estimates.
- The estimated exposures and risks are proportionally related to the amount of ai applied per acre and the amount of acres treated per day.

3.1 - Occupational Handler Risk Characterization

Single layer PPE (which includes gloves, but not respiratory protection) is sufficient to achieve MOEs of greater than 300 for all of the handler/applicator scenarios. The cancer risk is below1.0e-04 with single layer PPE and is below 1.0e-05 or 1.0e-06 with engineering controls. It should be noted that the cancer risk was calculated using the Q_1* approach which tends to be conservative. The study

data for spoon application is probably more accurate than the PHED data that would normally be used. The closest matching PHED scenario (#17 Granular Bait Dispersed by Hand) probably overestimates the exposure that would occur if a spoon were used. The dermal unit exposure for the PHED scenario is 71 mg/lb ai handled while the corresponding unit exposure for the spoon data is 2 mg/lb ai handled.

3. 2 - Post-Application Worker Risk Characterization

The number of days of exposure per year is not known and the standard values of 10 days per year for private growers and 30 days per year for commercial workers was used as a screen. It is understood that these values are probably conservative because oxyfluorfen is typically applied only two or three times per year.

The study data used to estimate DFR levels on conifers has serious deficiencies which include very low recovery, very high fortification levels, lack of method validation data and use of a non- standard dislodging solution. An attempt was made to account for these deficiencies by applying correction factors of 9 for the low recovery and 1.7 for the non-standard dislodging solution. Even with these correction factors, the study data indicates faster dissipation rates (90% for day 0 to day 1 and 37% after day 1) than the default value of 10%. Because acceptable chemical specific dislodgeable foliar data was not provided for bulb vegetables, the standard dissipation rate of 10% per day was used. It is possible that the standard dissipation rate underestimates the actual dissipation rate of oxyfluorfen and resulting risk estimates are conservative.

Oxyfluorfen is applied to weeds in Christmas tree plantations in a semi-directed manner to reduce tree contact and only the lower branches typically receive overspray. Therefore, the risk estimates for Christmas tree activities such as shearing are probably conservative. The typical oxyfluorfen application rate for tree rows in North Carolina is 0.375 lbs ai/acre (see references 15,16, and 17) which is less than the label rate of 1.0 to 2.0 lbs ai/acre. Oxyfluorfen is used at this rate for "chemical mowing" to inhibit weed growth while maintaining some ground cover to prevent erosion. It should also be noted that the risks for harvesting seedlings and Christmas trees was not calculated because these activities typically occur three to six months after the last oxyfluorfen application (per Jeff Owens, Weed Management Extension Specialist, NC State University).

3. 3 - Residential Risk Characterization

None of the residential applicator scenarios are of concern because the MOEs for non-cancer effects are greater than 100 and the cancer risks are less than 1.0 e-06 . It is suspected that the hose end data overestimates the exposure from the sprinkler can and invert jug methods because the hose end sprayer operates at a higher pressure and is more prone to leakage.

3.4 - Information and Data Needs

Acquisition of the following information will improve this exposure assessment.

- Frequency and timing of re-entry worker post application exposure following oxyfluorfen application to bulb vegetables.
- Acceptable DFR data for oxyfluorfen applied to conifers at label rates. This data is needed to confirm the conclusions drawn from the submitted study which has serious deficiencies.
- Case specific information regarding the exposure incidents that occurred in California.
- Spoon application data (data compensation issues need to be addressed so that the spoon data from MRID 452507-01 can be used in this assessment)

3.5 Risk Mitigation

The following actions are recommended to reduce occupational and residential exposure to oxyfluorfen:

- Handlers and applicators should wear at least single layer PPE to include gloves for dermal protection when mixing, loading and applying oxyfluorfen. Respiratory protection may also be required for the solvent components of the liquid product formulations.
- Christmas tree growers should avoid high contact activities such as shearing for several days after oxyfluorfen application, particularly if label rates are applied. The possibility of lowering the label rates by using chemical mowing should be investigated.

4. References

This document is based upon the following documents.

(1) Revised Oxyfluorfen (Goal) Quantitative Risk Assessment (Q1*) Based on CD-1 Male Mouse Dietary Study with 3/4's Interspecies Scaling Factor; Author Lori L. Brunsman, SAB/HED/OPP (09/24/98)
(2) Oxyfluorfen - Report of Food Quality Protection Act Safety Factor Committee ; Author: Brenda Tarplee, (Hed Document #014554 of 04/30/01)
(3) Oxyfluorfen Hazard Identification And Review Committee Report; Author: Kit Farwell, DVM, RRB1/HED/OPP; (HED Document #0145549 of 04/23/01)
(5) Review of Oxyfluorfen Incident Reports; Authors: Jerome Blondell, PhD, and Monica Spann, MPH, CEB1/HED/OPP; (HED Document #276054 of 07/03/01)
(6) Oxyfluorfen labels.
(7) Oxyfluorfen Use Closure Memo; Author: Deanna Scher, Chemical Review Manager for oxyfluorfen, SRRD/OPP; Memo directed to Oxyfluorfen Team (7/01/99).
(8) Draft Standard Operating Procedures for Residential Exposure Assessments. U.S. EPA. February 10, 1998.
(9) HED Science Advisory Council for Exposure, Policy 003.1, "Agricultural Default Transfer Coefficients" Health Effect Division, Office of Pesticide Programs. August, 1998.
(10) HED Science Advisory Council for Exposure, Policy.007, "Use of Values from the PHED Surrogate Table and Chemical-Specific Data." Health Effects Division, Office of Pesticide Programs. January, 1999.
(11) HED Science Advisory Council for Exposure, Policy.009, "Standard Values for Daily Acres Treated in Agriculture" Health Effects Division, Office of Pesticide Programs. July 2000.
(12) PHED Surrogate Exposure Guide, V1.1. Health Effects Division, Office of Pesticide Program. August, 1998."
(13) Application of Pesticides to Crops, G. A. Matthews, Imperial College Press, 1999
(14) USDA Crop Profiles
(15) "Chemical Mowing with Post-Emergent Herbicides in Fraser Fir Christmas Trees", North Carolina Cooperative Extension Service
(16) "Weed Management in Conifer Seedbeds and Transplant Beds", HIL-449, Joseph C. Neal, NC State University, 1999
(17) Growing Christmas Trees in North Carolina, North Carolina Cooperative Extension Service, May 1997
(18) "Exposure of Herbicide Handlers in the CALTRANS Vegetation Control Program 1993-1994" California Environmental Protection Agency, April 27, 1995.
(19) A Strategy for Assessing and Managing Occupational Exposures, John Mulhausen and Joseph Damiano, AIHA Press, 2nd Edition, 1998.

5. Glossary of Terms Used in Occupational/Residential Exposure Assessment

TERM	DEFINITION
1.0e-06	1.0 X 10^{-6} or 0.000001 or one in a million
Baseline PPE	Includes long pants, long sleeved shirt, shoes, socks and no gloves or respirator
Commercial Re-entry Worker	A field worker who works at multiple farms
Custom Applicator	One who applies pesticides to multiple farms.
DAT	Day after treatment of an area with a pesticide
Dose	The amount of pesticide that is absorbed into the body.
Double Layer PPE	Includes coveralls over single layer PPE
ExpoSac - Scientific Advisory Committee for Exposure	A committee within the EPA Health Effects Division that reviews pesticide exposure assessments and develops policy.
Exposure	The amount of pesticide that impinges upon the skin or is inhaled.
Handler/Applicator	A worker who mixes, loads and applies pesticides
HED	Health Effects Division of OPP
HIARC Committee	Hazard Identification and Review Committee of HED
Intermediate Term	Seven days to several months
LOAEL	Lowest Observed Adverse Effect Level
MOE - Margin of Exposure	The ratio of the "safe" dose (usually the NOAEL or the LOAEL) divided by the estimated exposure. Formerly called the Margin of Safety.
NOAEL	No Observed Adverse Effect Level
PF5 Respirator	A filtering facepiece respirator (i.e. dustmask) that has a protection factor of 5
PF10 Respirator	A half face respirator with cartridges that has a protection factor of 10
PHED	Pesticide Handlers Exposure Database
Private Grower Applicator	One who applies pesticides only to single farms.
Re-entry Worker	One who works in fields that have been treated with pesticides
REI - Restricted Entry Interval	The period of time that must pass following pesticide application before workers are allowed to go into the treated area.
Short Term	One to seven days
Single Layer PPE	Includes baseline PPE with chemical resistance gloves

APPENDIX A

STANDARD FORMULAS USED FOR CALCULATING OCCUPATIONAL AND RESIDENTIAL EXPOSURES TO OXYFLUORFEN

General Information:

The following standard formulas taken from references 1, 2 and 3 were used to calculate occupational and residential exposures to oxyfluorfen. The basic rationale for these calculations is that the daily exposure is the product of the amount of ai handled per day times a unit exposure value. The amount of ai handled per day is the product of the application rate times the area treated. For example if 2.0 lb/acre of oxyfluorfen were applied to 200 acres in one day, the amount of oxyfluorfen handled that day would be 400 lbs. The unit exposure value is the amount of exposure that results from handling given amount of active ingredient by a certain method while using certain PPE. For example, the dermal unit exposure value for mixing and loading liquids with only minimal PPE is 2.9 mg per pound of ai handled. In this example, the daily exposure would be 400 lbs handled times 2.9 mg unit exposure per pound which equals 1160 mg. The daily absorbed dose (mg/kg BW) is calculated from the exposure by multiplying the exposures times an absorption factor (0.18) and dividing the result by the body weight (60 kg). In this example the daily dose would be (1160 mg *0.18)/60 kg which would equal 3.48 mg/kg.

A. Occupational Handler/Applicator Exposure and Risk (Non-Cancer)

Daily dermal exposure is calculated:

Daily dermal exposure = Unit exposure x Application rate x Area Treated
(mg/day) (mg/lb ai) (lb ai/acre) (acres/day)

Where:

Daily dermal exposure = amount deposited on the surface of the skin that is available for dermal absorption, also referred to as potential dose (mg/day);
Unit exposure = normalized exposure value (mg exposure per pound ai handled) derived from chemical specific study data or from the PHED Surrogate Exposure Table
Application rate = normalized application rate based on a logical unit treatment such as acres, a maximum value is generally used (lb ai/acre); and
Area treated = normalized application area such as acres/day.

[Note: (lb ai/acre) and (A/day) are replaced, respectively, with (lb ai/gal) and (gal/day) when appropriate]

Daily inhalation exposure is calculated:

Daily inhalation exposure = [Unit exposure x Application rate x Area Treated] / Conversion Factor
(mg/day) (ug/lb ai handled) x (lb ai/acre) x (acres/day) (1 mg/1000 ug)

Where:

Daily inhalation exposure = amount available for absorption, also referred to as potential dose (mg/day);
Unit exposure = normalized exposure value (µg/lb ai handled) derived from study data or PHED;
Application rate = same as for dermal exposure (lb ai/acre); and
Daily treatment = same as for dermal exposure (acres/day).

Daily dermal and inhalation doses are then calculated by normalizing the daily dermal and inhalation exposures by body weight. For handlers/applicators using oxyfluorfen, a body weight of 60 kg (adult female body weight) was used for all exposure scenarios because the effects observed in the toxicological studies were of concern for females 13-50 years of age.

Daily inhalation exposure levels were calculated for inclusion into the PHED surrogate exposure tables and presented as (µg/lb ai) based on a human inhalation rate of 29 L/minute and an 8-hour working day. The dermal and inhalation doses for short- and intermediate-term scenarios were calculated using the following equation.

Absorbed Daily Dose is calculated:

Absorbed daily dermal or inhalation dose = (Daily dermal or inhalation exposure x absorption factor) / body weight
(mg/kg/day) (mg/day) (unitless) (kg)

[Note: an absorption factor of 0.18 was used for dermal exposures and 1.0 for inhalation exposures.]

Because oxyfluorfen exposures from the dermal and inhalation routes have the same toxicological effects, a combined absorbed daily dose can be calculated. Once the combined absorbed daily doses are calculated, the combined Margins of Exposure (MOEs) can be calculated.

Combined Absorbed Daily Dose is calculated:

Combined Dose (mg/kg/day) = Absorbed dermal dose (mg/kg/day) + Absorbed inhalation dose (mg/kg/day)

Combined Margin of Exposure is calculated:

Combined MOE (unitless) = NOAEL (mg/kg/day) / Combined Dose (mg/kg/day)

The target MOEs are 100 for short term exposures and 300 for intermediate term exposures. Scenarios with MOEs greater than the target MOEs do not exceed the Agency's level of concern for the occupational population.

B. Occupational Handler/Applicator Risk (Cancer)

Average daily doses for cancer risk assessments are calculated as described above for non-cancer risk assessment except that the average application rates and acres treated per day are used instead or the maximum rates. Once the average daily dose is calculated, a Lifetime Average Daily Dose (LADD) can be calculated. To obtain the cancer risk associated with a specific exposure scenario, the LADD is multiplied by Q_1*.

Lifetime Average Daily Dose (LADD) is calculated:

LADD = Combined Dose x (# days worked/365 days per year) x (35 years worked/70 year lifetime)
(mg/kg/day) (mg/kg/day)

[Note: the # days worked is 30 days for custom applicator and 10 days for private growers.]

Cancer Risk is calculated: Cancer Risk = LADD (mg/kg/day) x Q_1^* $(mg/kg/day)^{-1}$

C. Post-Application Worker (Non-Cancer Risk)

The calculations used to estimate daily dermal dose and the MOE for the dermal post-application scenarios are similar to those described above for the handler/applicator scenarios. The only major difference is that the daily dermal dose is calculated by multiplying the dislodge-able foliar residue level (ug/cm^2 of leaf area) times a transfer coefficient (amount of leaf area contacted per hour for a given activity). Inhalation exposures were not calculated for the post-application scenarios because inhalation exposures have been shown to account for a negligible percentage of the overall body burden. This is particularly true for Oxyfluorfen which has a very low vapor pressure (2.0 e-07 torr at 20 C).

The following equation was used to calculate dermal doses for oxyfluorfen on each post-application exposure day after application.

Post-Application Dermal dose is calculated:

Dermal dose = (DFR at day t x TC x DA x conversion factor x # hours worked/day) / body weight (kg)
(mg/kg/day) (ug/cm^2)

Where:

DFR = dislodgeable foliar residue (ug/cm^2) at day (t) after application
TC = transfer coefficient (cm^2/hour)
DA = dermal absorption factor = 0.18 for Oxyfluorfen
Hours worked/day = standard assumption is 8 hours
Body weight = 60 kg for non-cancer risks and 70 kg for cancer risks.

Once the post-application dermal doses are calculated, the dermal Margins of Exposure (MOEs) can be calculated. The target MOEs are 100 for short term exposures and 300 for intermediate term exposures. Scenarios with MOEs greater than the target MOEs do not exceed the Agency's level of concern for the occupational population.

Margin of Exposure is calculated:

MOE (unitless) = NOAEL (mg/kg/day) / Absorbed Dermal Dose (mg/kg/day)

References

(1) Standard Operating Procedures for Residential Exposure Assessments. U.S. EPA. December 18, 1997.

(2) Series 875 - Occupational and Residential Exposure Test Guidelines, Group B - Post Application Exposure Monitoring Test Guidelines. U.S. EPA. February 10, 1998.

(3) PHED Surrogate Exposure Guide, V1.1. Health Effects Division, Office of Pesticide Program. August, 1998."

APPENDIX B

OXYFLUORFEN OCCUPATIONAL HANDLER EXPOSURE AND RISK ASSESSMENT TABLES

Table B1: Unit Exposure Data for Oxyfluorfen Occupational Exposure Assessment

Mitigation Levels [A]	Unit Exposure Values (Per lb Ai Handled)	Data Confidence[B]
Scenarios 1A, 2A , 3A , 4A , 5 and 6A - Mix/Load Liquids for Large Groundboom, Small Groundboom, ATV Groundboom, Aerial Fixed Wing , Chemigation and Right of Way Sprayer (PHED data)		
Baseline	Dermal = 2.9 mg Inhalation = 1.2 ug	Hand and dermal are AB grades, and inhalation are AB grades. Hand replicates =53 replicates; Dermal = 72 to 122 replicates; and inhalation = 85 High confidence in hand/dermal and inhalation data. No protection factor was needed to define the unit exposure.
Single Layer	Dermal = 0.023 mg Inhalation = 1.2 ug	The same dermal data and inhalation data are used as for baseline. Gloved hand data = AB grades, replicates = 59.
Double Layer	Dermal = 0.0175 mg Inhalation = 1.2 ug	The same dermal data are used as for baseline with a 50% protection factor to account for the use of an additional layer of clothing (i.e., coverall suit). The same gloved hand data are used as for single layer. The same inhalation data are used as for the baseline.
Double Layer PF5	Dermal = 0.0175 mg Inhalation = 0.24 ug	Same as above with an 80% protection factor applied to baseline inhalation data to account for the use of a PF5 dust/mist respirator.
Double Layer PF10	Dermal = 0.0175 mg Inhalation = 0.12 ug	Same as above with an 90% protection factor applied to baseline inhalation data to account for the use of a PF10 cartridge respirator.
Engineering Controls	Dermal = 0.0086 mg Inhalation = 0.083 ug	Hand and dermal unit exposure are AB grades. Hand = 31 replicates; and dermal = 16 to 22 replicates. High confidence in dermal and hand data data are AB grade; replicates = 27. High confidence in inhalation data.
Scenarios 1B, 2B and 3B - Spray Application , Large , Small and ATV Groundboom (PHED Data)		
Baseline	Dermal =0.014 mg Inhalation = 0.74 ug	Hand, dermal, and inhalation data = AB grades. Hand = 29 replicates; dermal = 23 to 42 replicates; and inhalation = 22 replicates. High confiden hand/dermal and inhalation data. No protection factor was needed to define the unit exposure value.
Single Layer	Dermal = 0.014 mg Inhalation = 0.74 ug	The same dermal and inhalation data are used as for baseline. Gloved hand data are ABC grades, with 21 replicates, and medium confidence lev
Double Layer	Dermal = 0.011 mg Inhalation = 0.74 ug	The same dermal data are used as for baseline with a 50% protection factor to account for the use of an additional layer of clothing. Gloved ha ABC grades with 21 replicates and a medium confidence level. The same inhalation data are used as for the baseline.
Double Layer PF5	Dermal = 0.011 mg Inhalation = 0.15 ug	Same as above with an 80% protection factor applied to baseline inhalation data to account for the use of a PF5 dust/mist respirator.
Double Layer PF10	Dermal = 0.011 mg Inhalation = 0.074 ug	Same as above with an 90% protection factor applied to baseline inhalation data to account for the use of a PF10 cartridge respirator.

Mitigation Levels [A]	Unit Exposure Values (Per lb Ai Handled)	Data Confidence[B]
Engineering Controls	Dermal = 0.005 mg Inhalation = 0.043 ug	Hand and dermal unit exposure are ABC grades. Hand =16 replicates; and dermal = 20-31 replicates. Medium confidence in dermal and hand da Inhalation data are AB grade; replicates =16. High confidence in inhalation data. Gloves not worn.
Scenario 4B - Aerial Fixed Wing Spray Application , Closed Cockpit (PHED Data)		
Baseline	Dermal = 0.005 mg Inhalation = 0.068 ug	Hands = AB grade, dermal and inhalation=ABC grade. Hands=34 replicates; dermal =24 to 48 replicates, and inhalation =23 replicates. Medium C in dermal and inhalation data; high confidence in hand data. No protection factor was needed to define the unit exposure value as no PPE is wo while airborne.
Scenario 4C - Flag Aerial Spray Applications (PHED data)		
Baseline	Dermal =0.011mg Inhalation = 0.35 ug	Hands, dermal and inhalation AB grades. Dermal =18 to 28 replicates; Hands =30 replicates; and inhalation=28 replicates. High confidence in de hand, and inhalation data.
Single Layer	Dermal = 0.012 mg Inhalation = 0.35 ug	The same dermal and inhalation data are used as for baseline. Gloved hand data are AB grades with 6 replicates and low confidence.
Double Layer	Dermal = 0.011 mg Inhalation = 0.35 ug	The same dermal data are used as for baseline with a 50% protection factor to account for the use of an additional layer of clothing. The same data are used as for single layer. The same inhalation data are used as for baseline.
Double Layer PF5	Dermal = 0.011 mg Inhalation = 0.070 ug	Same as above with an 80% protection factor applied to baseline inhalation data to account for the use of a PF5 dust/mist respirator.
Double Layer PF10	Dermal = 0.011 mg Inhalation = 0.035 ug	Same as above with an 90% protection factor applied to baseline inhalation data to account for the use of a PF10 cartridge respirator.
Engineering Controls	Dermal = 0.00022 mg Inhalation = 0.007 ug	The same data are used as for baseline with a 98% protection factor to simulate closed cab.
Scenario 6B - Spray Application Using Right of Way Sprayer (PHED Data)		
Baseline	Dermal =1.3 mg Inhalation = 3.9 ug	Dermal = 4 - 20 replicates, ABC grades. Hand = 16 replicates, AB grade. Inhalation = 16 replicates, A grade. Low confidence in hand and derma to low number of replicates. High confidence in inhalation data. No protection factor was needed to define the unit exposure value.
Single Layer	Dermal = 0.39 mg Inhalation = 3.9 ug	The same dermal and inhalation data are used as for baseline. Gloved hand data = 4 replicates, AB grade. Low confidence in hand data due to of replicates.
Double Layer	Dermal = 0.29 mg Inhalation = 3.9 ug	The same dermal data are used as for baseline with a 50% protection factor to account for the use of an additional layer of clothing. The same data are used as for single layer. The same inhalation data are used as for baseline.

Mitigation Levels [A]	Unit Exposure Values (Per lb Ai Handled)	Data Confidence[B]
Double Layer PF5	Dermal = 0.29 mg Inhalation = 0.78 ug	Same as above with an 80% protection factor applied to baseline inhalation data to account for the use of a PF5 dust/mist respirator.
Double Layer PF10	Dermal = 0.29 mg Inhalation = 0.39 ug	Same as above with an 90% protection factor applied to baseline inhalation data to account for the use of a PF10 cartridge respirator.
Engineering Controls	ND	No data is currently available for this scenario with engineering controls.
Scenario 7 - Mix/Load/Apply Liquids Using Backpack Sprayer (PHED Data)		
Baseline	Dermal = ND Inhalation = 30 ug	No data is available for dermal exposure. Inhalation = 11 replicates, A grade. Low confidence due to low number of replicates.
Single Layer	Dermal = 2.5 mg Inhalation = 30 ug	Dermal = 9 - 11 replicates, AB grades. Hand = 11 replicates, C grade. Same inhalation data are used as for baseline. Low confidence in dermal a data due to low number of replicates.
Double Layer	Dermal = 1.6 mg Inhalation = 30 ug	The same dermal data are used as for single layer PPE with a 50% protection factor to account for the use of an additional layer of clothing. The gloved hand data are used as for single layer. The same inhalation data are used as for baseline.
Double Layer PF5	Dermal = 1.6 mg Inhalation = 6.0 ug	Same as above with an 80% protection factor applied to baseline inhalation data to account for the use of a PF5 dust/mist respirator.
Double Layer PF10	Dermal = 1.6 mg Inhalation = 3.0 ug	Same as above with an 90% protection factor applied to baseline inhalation data to account for the use of a PF10 cartridge respirator.
Engineering Controls	ND	No data is currently available for this scenario with engineering controls.
Scenario 8A - Load Granules for ATV Drawn Spreader (PHED Data)		
Baseline	Dermal = 0.0084 mg Inhalation = 1.7 ug	Dermal = 33 - 78 replicates, ABC grades. Hand = 10 replicates, All grade. Inhalation = 58 replicates, AB grade. Low confidence due to poor grad of hand replicates and low replicate number. High confidence in inhalation data. No protection factor was needed to define the unit exposure v
Single Layer	Dermal = 0.0069 mg Inhalation = 1.7 ug	Dermal = 33 - 78 replicates, ABC grades. Gloved Hand = 45 replicates, AB grade. Medium confidence in dermal and hand data. Baseline inhalat was used.
Double Layer	Dermal = 0.0034 mg Inhalation = 1.7 ug	Dermal = 12 - 59 replicates, ABC grades. Gloved Hand = 45 replicates, AB grade. Low confidence in dermal data due to low replicate number f body parts. Baseline inhalation data was used.
Double Layer PP5	Dermal = 0.0034 mg Inhalation = 0.34 ug	Same as above with an 80% protection factor applied to baseline inhalation data to account for the use of a PF5 dust/mist respirator.

Mitigation Levels [A]	Unit Exposure Values (Per lb Ai Handled)	Data Confidence[B]
Double Layer PP10	Dermal = 0.0034 mg Inhalation = 0.17 ug	Same as above with an 90% protection factor applied to baseline inhalation data to account for the use of a PF10 cartridge respirator.
Engineering Controls	Dermal = 0.00017 mg Inhalation = 0.034 ug	The same hand, dermal and inhalation data are used as for baseline with a 98% protection factor to account for the use of engineering controls
Scenario 8B - Apply Granules with an ATV Drawn Spreader (PHED Data)		
Baseline	Dermal = 0.0099 mg Inhalation = 1.2 ug	Dermal = 1-5 replicates, AB grades. Hand = 5 replicates, AB grade. Inhalation = 5 replicates, AB grade. Low confidence due to inadequate repl number.
Single Layer	Dermal = 0.0072 mg Inhalation = 1.2 ug	Dermal = 1-5 replicates, AB grades. Low confidence due to inadequate replicate number. Hand data estimated from baseline with a 90% protec to account for the use of gloves. Baseline inhalation data was used with no protection factors.
Double Layer	Dermal = 0.0042 mg Inhalation = 1.2 ug	Dermal data estimated from baseline with a 50% protection factor to account for the use of coveralls. Hand data estimated from baseline with a 9 protection factor to account for the use of gloves. Baseline inhalation data was used with no protection factors.
Double Layer PF5	Dermal = 0.0042 mg Inhalation = 0.24 ug	Same as above with an 80% protection factor applied to baseline inhalation data to account for the use of a PF5 dust/mist respirator.
Double Layer PF10	Dermal = 0.0042 mg Inhalation = 0.12 ug	Same as above with an 90% protection factor applied to baseline inhalation data to account for the use of a PF10 cartridge respirator.
Engineering Controls	Dermal = 0.0021 mg Inhalation = 0.22 ug	Dermal = 2 - 30 replicates, AB grade. Hand = 17 replicates, AB grade. Neck data has only two replicates. Other body parts have 27 - 30 replicates. High Confidence except for neck data. Inhalation = 37 replicates, AB grade. High Confidence.
Scenario 9 - Load/Apply Granules Using Push Type Broadcast Spreader (PHED Data)		
Baseline	Dermal = 2.9 mg Inhalation = 6.3 ug	Dermal =0 - 15 replicates, C grades. Hand = 15 replicates, C grade. Inhalation = 15 replicates, B grade. Low confidence in hand and dermal data number of replicates and lack of head or neck replicates. High confidence in inhalation data. No protection factor was needed to define the unit value.
Single Layer	Dermal = 1.3 mg Inhalation = 6.3 ug	The same hand and dermal data are used as for baseline with a 90% protection factor for the hand data to account for the use of gloves. The s inhalation data are used as for baseline.
Double Layer	Dermal = 0.73 mg Inhalation = 6.3 ug	The same hand and dermal data are used as for baseline with a 90% protection factor for the hand data to account for the use of gloves and a 50 protection factor for the dermal data to account for the use of an additional layer of clothing. The same inhalation data are used as for baseline

Mitigation Levels [A]	Unit Exposure Values (Per lb Ai Handled)	Data Confidence[B]
Double Layer PP5	Dermal = 0.73 mg Inhalation = 1.3 ug	Same as above with an 80% protection factor applied to baseline inhalation data to account for the use of a PF5 dust/mist respirator.
Double Layer PF10	Dermal = 0.73 mg Inhalation = 0.63 ug	Same as above with an 90% protection factor applied to baseline inhalation data to account for the use of a PF10 cartridge respirator.
Engineering Controls	ND	No data is currently available for this scenario with engineering controls.
Scenario 10 - Load and Apply Granules Using a Spoon (data from MRID 452507-01)		
Baseline	Dermal = ND Inhalation = 45 ug	No dermal data is currently available for this scenario with baseline PPE. Inhalation data = 10 replicates, Grade A. Low confidence due to low number of replicates.
Single Layer	Dermal = 2.0 mg Inhalation = 45 ug	Dermal = 10 replicates, A grade. Hand = 10 replicates, A grade. Low confidence in dermal and hand data due to low number of replicates. The inhalation data are used as for the baseline.

Notes for Table 1

A Baseline - long pants, long sleeved shirt, no gloves, no respirator, open mixing/loading, open cab tractor for groundboom applications, and open flagging.
Single Layer - chemical resistant gloves, long pants, long sleeved shirt, hat and no respirator.
Double Layer - coveralls over single layer clothing, chemical resistant gloves .
Double Layer PF5 - Same as above with a PF5 Dust/mist respirator or dust mask
Double Layer PF10 - Same as above with a PF10 half face cartridge respirator
Engineering Controls - Includes closed mixing/loading and/or enclosed cab application

B Data confidence is based up the number of replicates and the quality of the data. Data grades are based on field and laboratory recovery data provided as part of the exposure studies. A replicate refers to data acquired during one complete work cycle. Data grades are assigned as follows:

Data Grade	% Lab Recovery	CV for Lab Recovery	% Field Recovery	% Storage Stability	Data Corrected for:
A	90-110	≤15	70-120	Not Needed	Field Recovery (If <90%)
B	80-110	≤25	50-120	Not Needed	Field Recovery
C	70-120 70-120	≤33 ≤33	30-120 Missing	Not Needed 50-120	Field Recovery Storage Stability
D	60-120	≤33	Not Needed	Not Needed	Field recovery, storage stability or lab recovery
E	Does not meet above criteria				

These data grades are combined with the number of replicates

High confidence run - grades A and B data and 15 or more replicates per body part.

to determine the confidence of each data set as follows:

Medium confidence run - grades A, B, and C data and 15 or more replicates per body part.
Low confidence run - all grades (any run that includes D or E grade data) or has less than 15 replicates per body part.

Table B2: Agricultural Application Rates and Methods for Oxyfluorfen

Application Method	Crops Treated	Maximum Application Rate (lb ai/acre)	Typical Application Rate	Maximum Treated Area (Acre/day)	Typical Treated Area	Comments
1 - Large Groundboom	Cotton, soybeans, Garbanzo beans Onions, garlic, horseradish, Broccoli, Cabbage, Cauliflower Mint (dormant)	0.5 0.5 2.0	0.25 0.50 1.0	200 80 80	80 80 80	
2 - Small Groundboom	Trees, nursery (seedbeds, transplants, container stock) Orchard Floors (almonds, coffee) Vineyard floors (grape)	2.0 2.0 2.0	1.0 1.0 1.0	80 80 80	80 80 80	
3 - ATV Groundboom	Artichoke	2.0	1.0	40	40	Spray Volume = 40 gallons/acre
4 - Fixed Wing Aircraft	Fallow beds	0.5	0.25	1200	350	Primarily fallow cotton fields
5 - Chemigation	Onions, Garlic, Horseradish	0.5	0.25	350	350	
6 - Right of Way Sprayer	Right of Way Areas	2.0	1.0	25	25	1000 gallons/day 40 gallons per acre
7 - Backpack Sprayer	Conifer Plantations Using Label Rates	2.0	1.0	2	2	40 gallons/day 20 gallons per acre
7 - Backpack Sprayer	Conifer Plantations Using Lower Rates for Chemical Mowing	0.375	0.375	2	2	40 gallons/day 20 gallons per acre
8 - ATV Drawn Broadcast Spreader	Ornamentals, container, field grown and landscape	2.0	1.0	40	40	
9- Broadcast Spreader	Ornamentals, container, field grown and landscape	2.0	1.0	5	5	
10 - Spoon	Ornamentals, container grown	2.0	1.0	1	1	

Notes

1. Maximum Application Rates are taken from the labels and are used for calculation of non-cancer risks
2. Typical Application rates are taken from the use closure memo and BEAD data and are used for the calculation of cancer risks.
3. Maximum treated areas are high end values from the HED Science Advisory Council for Exposure Policy #009 " Standard Values for Daily Acres Treated in Agriculture"
4. Typical treated areas are from HED Exposure Policy #009 .

Table B3: Baseline Clothing Oxyfluorfen Worker Exposure and Risks (Non-Cancer, Short-Term)

Exposure Scenario	Crops	Application Rates (lb ai/Acre)	Treated Areas (Acres/day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Absorbed Daily Dose (mg/kg/day)[c]	Combined MOE[d]
				Dermal	Inhalation	Dermal	Inhalation		
1A - Mix/Load Liquids - Large Groundboom	Field/Row Crops (Onions, Cotton)	2.0	200	1160	0.48	3.5	0.0080	3.5	**8.6**
1B - Spray Application - Large Groundboom				5.6	0.30	0.0168	0.0049	0.0217	1380
2A - Mix/Load Liquids - Small Groundboom	Orchard/Vineyard Floors, Nursery Trees	2.0	80	464	0.19	1.4	0.0032	1.4	**22**
2B - Spray Application - Small Groundboom				2.2	0.12	0.0067	0.0020	0.0087	3451
3A - Mix/Load Liquids - ATV Groundboom	Artichokes	2.0	40	232	0.096	0.70	0.0016	0.70	**43**
3B - Spray Application - ATV Groundboom				1.1	0.059	0.0034	0.00099	0.0043	6902
4A - Mix/Load Liquids for Aerial Application	Fallow beds	0.50	1200	1740	0.720	5.2	0.01200	5.2	**5.7**
4B - Spray Application - Fixed-Wing Aircraft				3.0	0.041	0.0090	0.00068	0.0097	3099
4C - Flag Aerial Applications				6.6	0.21	0.0198	0.00350	0.0233	1288
5 - Mix/Load Liquids for Chemigation	Onion, Garlic, Horseradish	0.5	350	508	0.21	1.52	0.00350	1.5	**20**
6A - Mix/Load Liquids - Right of Way Sprayer	Right of Way Areas	2.0	25	145	0.06	0.44	0.00100	0.4	**69**
6B - Spray Application - Right of Way Sprayer				65	0.20	0.20	0.00325	0.20	**151**
7 - Mix/Load/Apply Liquids - Backpack	Conifers	2.0	2	No Data for This Scenario					
7 - Mix/Load/Apply Liquids - Backpack	Conifers	0.375	2	No Data for This Scenario					
8A - ATV Drawn Broadcast Spreader - Load	Ornamentals	2.0	40	0.7	0.136	0.0020	0.00227	0.0043	7005
8B - ATV Drawn Spreader - Apply	Ornamentals	2.0	40	0.8	0.096	0.0024	0.00160	0.0040	7545
9 - Push Type Broadcast Spreader (Load/Apply)	Ornamentals	2.0	5	29	0.063	0.0870	0.00105	0.0881	341
10 - Spoon (Load and Apply)	Ornamentals	2.0	1	No Data for This Scenario.					

Notes

a Daily Exposure (mg/day) = Application Rate (lb ai/Acre) * Treated Area (Acre/day) * Unit Exposure Value (mg or µg exposure/ lb ai handled) *[1mg/1000µg (conversion factor if necessa

b Absorbed Daily Dose (mg/kg/day) = Daily Exposure (mg/day) * Absorption Factor (0.18 for dermal; 1.0 for inhalation) ÷ Body Weight (60kg).

c Combined Absorbed Daily Dose (mg/kg/day) = Dermal Absorbed Daily Dose (mg/kg/day) + Inhalation Absorbed Daily Dose (mg/kg/day).

d MOE (unitless) = NOAEL (mg/kg/day) ÷ Combined Absorbed Daily Dose (mg/kg/day). Where NOAEL = 30 mg/kg/day for short-term exposures. A Margin of Exposure (MOE) of 100 or greater is acceptable for Oxyfluorfen short term exposures.

Table B4: Single Layer PPE w/o Respirator Oxyfluorfen Worker Exposure and Risks (Non-Cancer, Short-Term)

Exposure Scenario	Crops	Application Rates (lb ai/Acre)	Treated Areas (Acres/day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Absorbed Daily Dose(mg/kg/day)[c]	Combined MOE[d]
				Dermal	Inhalation	Dermal	Inhalation		
1A - Mix/Load Liquids - Large Groundboom	Field/Row Crops (Onions, Cotton)	2.0	200	9.2	0.480	0.0276	0.00800	0.0356	843
1B - Spray Application - Large Groundboom				5.6	0.296	0.0168	0.00493	0.0217	1380
2A - Mix/Load Liquids - Small Groundboom	Orchard/Vineyard Floors, Nursery Trees	2.0	80	3.7	0.192	0.0110	0.00320	0.0142	2107
2B - Spray Application - Small Groundboom				2.2	0.118	0.0067	0.00197	0.0087	3451
3A - Mix/Load Liquids -ATV Groundboom	Artichokes	2.0	40	1.8	0.096	0.0055	0.00160	0.0071	4213
3B - Spray Application - ATV Groundboom				1.1	0.059	0.0034	0.00099	0.0043	6902
4A - Mix/Load Liquids for Aerial Application	Fallow beds	0.50	1200	13.8	0.720	0.0414	0.01200	0.0534	562
4B - Spray Application - Fixed-Wing Aircraft				ND - Gloves are not worn during aerial application					
4C - Flag Aerial Applications				7.2	0.210	0.022	0.00350	0.025	1195
5 - Mix/Load Liquids for Chemigation	Onions, Garlic, Horseradish	0.50	350	4.0	0.210	0.012	0.00350	0.016	1926
6A - Mix/Load Liquids - Right of Way Sprayer	Right of Way Areas	2.0	25	1.2	0.060	0.0035	0.00100	0.0045	6742
6B - Spray Application - Right of Way Sprayer				20	0.195	0.06	0.00325	0.06	486
7 - Mix/Load/Apply Liquids - Backpack	Conifers	2.0	2	10	0.120	0.030	0.00200	0.032	938
7 - Mix/Load/Apply Liquids - Backpack	Conifers	0.375	2	1.9	0.0225	0.0056	0.00038	0.0060	5000
8A - ATV Drawn Broadcast Spreader - Load	Ornamentals	2.0	40	0.55	0.136	0.0017	0.00227	0.0039	7648
8B - ATV Drawn Spreader - Apply	Ornamentals	2.0	40	0.58	0.096	0.0017	0.00160	0.0033	9014
9 - Push Type Broadcast Spreader (Load/Apply)	Ornamentals	2.0	5	13	0.063	0.0390	0.00105	0.040	749
10 - Spoon	Ornamentals	2.0	1	4.0	0.0900	0.0120	0.0015	0.014	2222

Notes

a Daily Exposure (mg/day) = Application Rate (lb ai/Acre) * Treated Area (Acre/day) * Unit Exposure Value (mg or µg exposure/ lb ai handled) *[1mg/1000µg (conversion factor if necessa

b Absorbed Daily Dose (mg/kg/day) = Daily Exposure (mg/day) * Absorption Factor (0.18 for dermal; 1.0 for inhalation) ÷ Body Weight (60kg).

c Combined Absorbed Daily Dose (mg/kg/day) = Dermal Absorbed Daily Dose (mg/kg/day) + Inhalation Absorbed Daily Dose (mg/kg/day).

d MOE (unitless) = NOAEL (mg/kg/day) ÷ Combined Absorbed Daily Dose (mg/kg/day). Where NOAEL = 30 mg/kg/day for short-term exposures.
A Margin of Exposure (MOE) of 100 or greater is acceptable for Oxyfluorfen short term exposures.

Table B5: Baseline Clothing Oxyfluorfen Worker Exposure and Risks (Non-Cancer, Intermediate-Term)

Exposure Scenario	Crops	Application Rates (lb ai/Acre)	Treated Areas (Acres/day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Absorbed Daily Dose(mg/kg/day)[c]	Combined MOE[d]
				Dermal	Inhalation	Dermal	Inhalation		
1A - Mix/Load Liquids - Large Groundboom	Field/Row Crops (Onions, Cotton)	2.0	200	1160	0.48	3.0	0.0069	3.0	**10.7**
1B - Spray Application - Large Groundboom				5.6	0.30	0.0144	0.0042	0.0186	1718
2A - Mix/Load Liquids - Small Groundboom	Orchard/Vineyard Floors, Nursery Trees	2.0	80	464	0.19	1.2	0.0027	1.2	**27**
2B - Spray Application - Small Groundboom				2.2	0.12	0.0058	0.0017	0.0075	4294
3A - Mix/Load Liquids - ATV Groundboom	Artichokes	2.0	40	232	0.096	0.60	0.0014	0.60	**54**
3B - Spray Application - ATV Groundboom				1.1	0.059	0.0029	0.00085	0.0037	8589
4A - Mix/Load Liquids for Aerial Application	Fallow beds	0.50	1200	1740	0.720	4.5	0.01029	4.5	**7.1**
4B - Spray Application - Fixed-Wing Aircraft				3.0	0.041	0.0077	0.00058	0.0083	3857
4C - Flag Aerial Applications				6.6	0.21	0.0170	0.00300	0.0200	1602
5 - Mix/Load Liquids for Chemigation	Onion, Garlic, Horseradish	0.5	350	508	0.21	1.31	0.00300	1.3	**24**
6A - Mix/Load Liquids - Right of Way Sprayer	Right of Way Areas	2.0	25	145	0.06	0.37	0.00086	0.4	**86**
6B - Spray Application - Right of Way Sprayer				65	0.20	0.17	0.00279	0.17	**188**
7 - Mix/Load/Apply Liquids - Backpack	Conifers	2.0	2	No Data for This Scenario					
7 - Mix/Load/Apply Liquids - Backpack	Conifers	0.375	2	No Data for This Scenario					

Exposure Scenario	Crops	Application Rates (lb ai/Acre)	Treated Areas (Acres/day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Absorbed Daily Dose(mg/kg/day)[c]	Combined MOE[d]
				Dermal	Inhalation	Dermal	Inhalation		
8A - ATV Drawn Broadcast Spreader - Load	Ornamentals	2.0	40	0.7	0.136	0.0017	0.00194	0.0037	8717
8B - ATV Drawn Spreader - Apply	Ornamentals	2.0	40	0.8	0.096	0.0020	0.00137	0.0034	9390
9 - Push Type Broadcast Spreader (Load/Apply)	Ornamentals	2.0	5	29	0.063	0.0746	0.00090	0.0755	424
10 - Spoon (Load and Apply)	Ornamentals	2.0	1	No Data for This Scenario.					

Notes

a Daily Exposure (mg/day) = Application Rate (lb ai/Acre) * Treated Area (Acre/day) * Unit Exposure Value (mg or µg exposure/ lb ai handled) *[1mg/1000µg (conversion factor if necessa

b Absorbed Daily Dose (mg/kg/day) = Daily Exposure (mg/day) * Absorption Factor (0.18 for dermal; 1.0 for inhalation) ÷ Body Weight (70kg).

c Combined Absorbed Daily Dose (mg/kg/day) = Dermal Absorbed Daily Dose (mg/kg/day) + Inhalation Absorbed Daily Dose (mg/kg/day).

d MOE (unitless) = NOAEL (mg/kg/day) ÷ Combined Absorbed Daily Dose (mg/kg/day). Where NOAEL = 32 mg/kg/day for intermediate-term exposures.
A Margin of Exposure (MOE) of 300 is acceptable for intermediate term exposures.

Table B6: Single Layer w/o Respirator Oxyfluorfen Worker Exposure and Risks (Non-Cancer, Intermediate-Term)

Exposure Scenario	Crops	Application Rates (lb ai/Acre)	Treated Areas (Acres/ day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Absorbed Daily Dose(mg/kg/day)[c]	Combined MOE[d]
				Dermal	Inhalation	Dermal	Inhalation		
1A - Mix/Load Liquids - Large Groundboom	Field/Row Crops (Onions, Cotton)	2.0	200	9.2	0.480	0.0276	0.00800	0.0356	899
1B - Spray Application - Large Groundboom				5.6	0.296	0.0168	0.00493	0.0217	1472
2A - Mix/Load Liquids - Small Groundboom	Orchard/Vineyard Floors, Nursery Trees	2.0	80	3.7	0.192	0.0110	0.00320	0.0142	2247
2B - Spray Application - Small Groundboom				2.2	0.118	0.0067	0.00197	0.0087	3681
3A - Mix/Load Liquids -ATV Groundboom	Artichokes	2.0	40	1.8	0.096	0.0055	0.00160	0.0071	4494
3B - Spray Application - ATV Groundboom				1.1	0.059	0.0034	0.00099	0.0043	7362
4A - Mix/Load Liquids for Aerial Application	Fallow beds	0.50	1200	13.8	0.720	0.0414	0.01200	0.0534	599
4B - Spray Application - Fixed-Wing Aircraft				ND - Gloves are not worn during aerial application					
4C - Flag Aerial Applications				7.2	0.210	0.022	0.00350	0.025	1275
5 - Mix/Load Liquids for Chemigation	Onions, Garlic, Horseradish	0.50	350	4.0	0.210	0.012	0.00350	0.016	2055
6A - Mix/Load Liquids - Right of Way Sprayer	Right of Way Areas	2.0	25	1.2	0.060	0.0035	0.00100	0.0045	7191
6B - Spray Application - Right of Way Sprayer				20	0.195	0.06	0.00325	0.06	518
7 - Mix/Load/Apply Liquids - Backpack	Conifers	2.0	2	10	0.120	0.030	0.00200	0.032	1000
7 - Mix/Load/Apply Liquids - Backpack	Conifers	0.375	2	1.9	0.0225	0.0056	0.00038	0.0060	5333
8A - ATV Drawn Broadcast Spreader - Load	Ornamentals	2.0	40	0.55	0.136	0.0017	0.00227	0.0039	8158
8B - ATV Drawn Spreader - Apply	Ornamentals	2.0	40	0.58	0.096	0.0017	0.00160	0.0033	9615
9 - Push Type Broadcast Spreader (Load/Apply)	Ornamentals	2.0	5	13	0.063	0.0390	0.00105	0.040	799

Exposure Scenario	Crops	Application Rates (lb ai/Acre)	Treated Areas (Acres/ day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Absorbed Daily Dose(mg/kg/day)[c]	Combined MOE[d]
				Dermal	Inhalation	Dermal	Inhalation		
10 - Spoon	Ornamentals	2.0	1	4.0	0.0900	0.0120	0.0015	0.014	2370

Notes

a Daily Exposure (mg/day) = Application Rate (lb ai/Acre) * Treated Area (Acre/day) * Unit Exposure Value (mg or µg exposure/ lb ai handled) *[1mg/1000µg (conversion factor if necessa

b Absorbed Daily Dose (mg/kg/day) = Daily Exposure (mg/day) * Absorption Factor (0.18 for dermal; 1.0 for inhalation) ÷ Body Weight (70kg).

c Combined Absorbed Daily Dose (mg/kg/day) = Dermal Absorbed Daily Dose (mg/kg/day) + Inhalation Absorbed Daily Dose (mg/kg/day).

d MOE (unitless) = NOAEL (mg/kg/day) ÷ Combined Absorbed Daily Dose (mg/kg/day). Where NOAEL = 32 mg/kg/day for intermediate-term exposures.
A Margin of Exposure (MOE) of 300 is acceptable for intermediate term exposures.

Table B7: Single Layer w/o Respirator Worker Exposure and Cancer Risk for Oxyfluorfen (30 days per Year)

Exposure Scenario	Crops	Application Rates (lb ai/Acre)	Treated Areas (Acres/day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Lifetime Absorbed Daily Dose (mg/kg/day)[c]	Cancer Risk[d]
				Dermal	Inhalation	Dermal	Inhalation		
1A - Mix/Load Liquids - Large Groundboom	Field/Row Crops (Onions, Cotton)	1.0	80	1.8	0.096	0.0047	0.00137	2.5e-04	1.8e-05
1B - Spray Application - Large Groundboom				1.1	0.059	0.0029	0.00085	1.5e-04	1.1e-05
2A - Mix/Load Liquids - Small Groundboom	Orchard/Vineyard Floors, Nursery Trees	1.0	80	1.8	0.096	0.0047	0.00137	2.5e-04	1.8e-05
2B - Spray Application - Small Groundboom				1.1	0.059	0.0029	0.00085	1.5e-04	1.1e-05
3A - Mix/Load Liquids - ATV Groundboom	Artichokes	1.0	40	0.92	0.048	0.0024	0.00069	1.3e-04	9.2e-06
3B - Spray Application - ATV Groundboom				0.56	0.030	0.0014	0.00042	7.7e-05	5.6e-06
4A - Mix/Load Liquids for Aerial Application	Fallow beds	0.25	350	2.0	0.105	0.0052	0.00150	2.7e-04	2.0e-05
4B - Spray Application - Fixed-Wing Aircraft[e]				0.44	0.0060	0.0011	0.0001	5.0e-05	3.6e-06
4C - Flag Aerial Applications				1.1	0.031	0.0027	0.00044	1.3e-04	9.4e-06
5 - Mix/Load Liquids for Chemigation	Onions, Garlic, Horseradish	0.25	350	2.0	0.105	0.0052	0.00150	2.7e-04	2.0e-05
6A - Mix/Load Liquids - Right of Way Sprayer	Right of Way Areas	1.0	25	0.6	0.030	0.0015	0.00043	7.8e-05	5.7e-06
6B - Spray Application - Right of Way Sprayer				10	0.098	0.025	0.00139	1.1e-03	8.0e-05
7 - Mix/Load/Apply Liquids - Backpack	Conifers	1.0	2	5.0	0.060	0.013	0.00086	5.6e-04	4.1e-05
7 - Mix/Load/Apply Liquids - Backpack	Conifers	0.375	2	1.9	0.023	0.005	0.00032	2.1e-04	1.5e-05
8A - ATV Drawn Broadcast Spreader - Load	Ornamentals	1.0	40	0.3	0.068	0.0007	0.00097	6.9e-05	5.1e-06
8B - ATV Drawn Broadcast Spreader - Apply	Ornamentals	1.0	40	0.3	0.048	0.0007	0.00069	5.9e-05	4.3e-06
9 - Push Type Broadcast Spreader (Load/Apply)	Ornamentals	1.0	5	6.5	0.032	0.017	0.00045	7.1e-04	5.2e-05
10 - Spoon	Ornamentals	1.0	1	2.0	0.045	0.0051	0.00064	2.4e-04	1.7e-05

Notes

a Daily Exposure (mg/day) = Application Rate (lb ai/Acre) * Treated Area (Acre/day) * Unit Exposure Value (mg or µg exposure/ lb ai handled) *[1mg/1000µg (conversion factor if necessa

b Absorbed Daily Dose (mg/kg/day) = Daily Exposure (mg/day) * Absorption Factor (0.18 for dermal; 1.0 for inhalation) ÷ Body Weight (70kg).

c Combined Lifetime Averaged Daily Dose (mg/kg/day) = Combined Potential Daily Dose (see note below) * 30 Annual Treatment Days / 365 days per year * 35 years working / 70 year life
Note - Combined Potential Daily Dose (mg/kg/day) = Dermal Potential Daily Dose (mg/kg/day) + Inhalation Potential Daily Dose (mg/kg/day).

d Carcinogenic Risk = Combined Lifetime Averaged Daily Dose (mg/kg/day) * Q_1^* $(mg/kg/day)^{-1}$. Q_1^* = 0.073 for Oxyfluorfen.
Carcinogenic risks of 1.0×10^{-6} or lower are below the Agency's level of concern. Carcinogenic risks in the 1.0×10^{-6} to 1.0×10^{-4} range should be reduced, when feasible, via mitigation m

e. Aerial applicator exposures are assessed using baseline hand exposure values since they do not wear chemical gloves while airborne.

Table B8: Double Layer w/o Respirator Worker Exposure and Cancer Risk for Oxyfluorfen (30 days per Year)

Exposure Scenario	Crops	Application Rates[a] (lb ai/Acre)	Treated Areas[b] (Acres/day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose(mg/kg/day)[b]		Combined Lifetime Absorbed Daily Dose (mg/kg/day)[c]	Cancer Risk[d]
				Dermal	Inhalation	Dermal	Inhalation		
1A - Mix/Load Liquids - Large Groundboom	Field/Row Crops (Onions, Cotton)	1.0	80	1.4	0.096	0.0036	0.00137	2.0e-04	1.5e-05
1B - Spray Application - Large Groundboom				0.9	0.0592	0.0023	0.00085	1.3e-04	9.4e-06
2A - Mix/Load Liquids - Small Groundboom	Orchard/Vineyard Floors, Nursery Trees	1.0	80	1.4	0.096	0.0036	0.00137	2.0e-04	1.5e-05
2B - Spray Application - Small Groundboom				0.9	0.0592	0.0023	0.00085	1.3e-04	9.4e-06
3A - Mix/Load Liquids - ATV Groundboom	Artichokes	1.0	40	0.7	0.0480	0.0018	0.00069	1.0e-04	7.5e-06
3B - Spray Application - ATV Groundboom				0.4	0.0296	0.0011	0.00042	6.4e-05	4.7e-06
4A - Mix/Load Liquids for Aerial Application	Fallow beds	0.25	350	1.5	0.105	0.0039	0.00150	2.2e-04	1.6e-05
4B - Spray Application - Fixed-Wing Aircraft				ND - Double layer PPE is not worn for aerial application.					
4C - Flag Aerial Applications				1.0	0.0306	0.0025	0.00044	1.2e-04	8.8e-06
5 - Mix/Load Liquids for Chemigation	Onions, Garlic, Horseradish	0.25	350	1.5	0.105	0.0039	0.00150	2.2e-04	1.6e-05
6A - Mix/Load Liquids - Right of Way Sprayer	Right of Way Areas	1.0	25	0.4	0.0300	0.0011	0.00043	6.4e-05	4.7e-06
6B - Spray Application - Right of Way Sprayer				7.3	0.098	0.0186	0.00139	8.2e-04	6.0e-05
7 - Mix/Load/Apply Liquids - Backpack	Conifers	1.0	2	3.2	0.0600	0.0082	0.00086	3.7e-04	2.7e-05
7 - Mix/Load/Apply Liquids - Backpack	Conifers	0.375	2	1.2	0.0225	0.0031	0.00032	1.4e-04	1.0e-05
8A - ATV Drawn Broadcast Spreader - Load	Ornamentals	1.0	40	0.1	0.0680	0.0004	0.00097	5.4e-05	4.0e-06
8B - ATV Drawn Broadcast Spreader - Apply	Ornamentals	1.0	40	0.2	0.0480	0.0004	0.00069	4.6e-05	3.4e-06
9 - Push Type Broadcast Spreader(Load/Apply)	Ornamentals	1.0	5	3.7	0.0315	0.0094	0.00045	4.0e-04	3.0e-05
10 - Spoon	Ornamentals	1.0	1	No data for this scenario.					

Notes

a Daily Exposure (mg/day) = Application Rate (lb ai/Acre) * Treated Area (Acre/day) * Unit Exposure Value (mg or µg exposure/ lb ai handled) *[1mg/1000µg (conversion factor if necessa

b Absorbed Daily Dose (mg/kg/day) = Daily Exposure (mg/day) * Absorption Factor (0.18 for dermal; 1.0 for inhalation) ÷ Body Weight (70kg).

c Combined Lifetime Averaged Daily Dose (mg/kg/day) = Combined Potential Daily Dose (see note below) * 30 Annual Treatment Days / 365 days per year * 35 years working / 70 year life
Note - Combined Potential Daily Dose (mg/kg/day) = Dermal Potential Daily Dose (mg/kg/day) + Inhalation Potential Daily Dose (mg/kg/day).

d Carcinogenic Risk = Combined Lifetime Averaged Daily Dose (mg/kg/day) * Q_1^* $(mg/kg/day)^{-1}$. Q_1^* = 0.073 for Oxyfluorfen.
Carcinogenic risks of 1.0×10^{-6} or lower are below the Agency's level of concern. Carcinogenic risks in the 1.0×10^{-6} to 1.0×10^{-4} range should be reduced, when feasible, via mitigation m

Table B9: Double Layer with PF5 Respirator Worker Oxyfluorfen Exposure and Cancer Risks

Exposure Scenario	Crops	Application Rates[a] (lb ai/Acre)	Treated Areas[b] (Acres/day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose(mg/kg/day)[b]		Combined Lifetime Absorbed Daily Dose (mg/kg/day)[c]	Cancer Risk[d]
				Dermal	Inhalation	Dermal	Inhalation		
1A - Mix/Load Liquids - Large Groundboom	Field/Row Crops (Onions, Cotton)	1.0	80	1.4	0.019	0.0036	0.00027	1.6e-04	1.2e-05
1B - Spray Application - Large Groundboom				0.9	0.0120	0.0023	0.00017	1.0e-04	7.3e-06
2A - Mix/Load Liquids - Small Groundboom	Orchard/Vineyard Floors, Nursery Trees	1.0	80	1.4	0.019	0.0036	0.00027	1.6e-04	1.2e-05
2B - Spray Application - Small Groundboom				0.9	0.0120	0.0023	0.00017	1.0e-04	7.3e-06
3A - Mix/Load Liquids - ATV Groundboom	Artichokes	1.0	40	0.7	0.0096	0.0018	0.00014	8.0e-05	5.8e-06
3B - Spray Application - ATV Groundboom				0.4	0.0060	0.0011	0.00009	5.0e-05	3.7e-06
4A - Mix/Load Liquids for Aerial Application	Fallow beds	0.25	350	1.5	0.021	0.0039	0.00030	1.7e-04	1.3e-05
4B - Spray Application - Fixed-Wing Aircraft				ND - Double layer PPE is not worn for aerial application.					
4C - Flag Aerial Applications				1.0	0.0061	0.0025	0.00009	1.1e-04	7.7e-06
5 - Mix/Load Liquids for Chemigation	Onions, Garlic, Horseradish	0.25	350	1.5	0.021	0.0039	0.00030	1.7e-04	1.3e-05
6A - Mix/Load Liquids - Right of Way Sprayer	Right of Way Areas	1.0	25	0.4	0.0060	0.0011	0.00009	5.0e-05	3.6e-06
6B - Spray Application - Right of Way Sprayer				7.3	0.020	0.0186	0.00028	7.8e-04	5.7e-05
7 - Mix/Load/Apply Liquids - Backpack	Conifers	1.0	2	3.2	0.0120	0.0082	0.00017	3.5e-04	2.5e-05
7 - Mix/Load/Apply Liquids - Backpack	Conifers	0.375	2	1.2	0.0045	0.0031	0.00006	1.3e-04	9.5e-06
8A - ATV Drawn Broadcast Spreader - Load	Ornamentals	1.0	40	0.1	0.0136	0.0004	0.00019	2.2e-05	1.6e-06
8B - ATV Drawn Broadcast Spreader - Apply	Ornamentals	1.0	40	0.2	0.0096	0.0004	0.00014	2.3e-05	1.7e-06
9 - Push Type Broadcast Spreader(Load/Apply)	Ornamentals	1.0	5	3.7	0.0065	0.0094	0.00009	3.9e-04	2.9e-05
10 - Spoon	Ornamentals	1.0	1	No data for this scenario.					

Notes

a Daily Exposure (mg/day) = Application Rate (lb ai/Acre) * Treated Area (Acre/day) * Unit Exposure Value (mg or µg exposure/ lb ai handled) *[1mg/1000µg (conversion factor if necessa

b Absorbed Daily Dose (mg/kg/day) = Daily Exposure (mg/day) * Absorption Factor (0.18 for dermal; 1.0 for inhalation) ÷ Body Weight (70kg).

c Combined Lifetime Averaged Daily Dose (mg/kg/day) = Combined Potential Daily Dose (see note below) * 30 Annual Treatment Days / 365 days per year * 35 years working / 70 year life
Note - Combined Potential Daily Dose (mg/kg/day) = Dermal Potential Daily Dose (mg/kg/day) + Inhalation Potential Daily Dose (mg/kg/day).

d Carcinogenic Risk = Combined Lifetime Averaged Daily Dose (mg/kg/day) * Q_1^* $(mg/kg/day)^{-1}$. Q_1^* = 0.073 for Oxyfluorfen.
Carcinogenic risks of 1.0×10^{-6} or lower are below the Agency's level of concern. Carcinogenic risks in the 1.0×10^{-6} to 1.0×10^{-4} range should be reduced, when feasible, via mitigation m

Table B10: Double Layer with PF10 Respirator Worker Oxyfluorfen Exposure and Cancer Risks

Exposure Scenario	Crops	Application Rates[a] (lb ai/Acre)	Treated Areas[b] (Acres/day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Lifetime Absorbed Daily Dose (mg/kg/day)[c]	Cancer Risk[d]
				Dermal	Inhalation	Dermal	Inhalation		
1A - Mix/Load Liquids - Large Groundboom	Field/Row Crops (Onions, Cotton)	1.0	80	1.4	0.010	0.0036	0.00014	1.5e-04	1.1e-05
1B - Spray Application - Large Groundboom				0.9	0.0059	0.0023	0.00008	9.6e-05	7.1e-06
2A - Mix/Load Liquids - Small Groundboom	Orchard/Vineyard Floors, Nursery Trees	1.0	80	1.4	0.010	0.0036	0.00014	1.5e-04	1.1e-05
2B - Spray Application - Small Groundboom				0.9	0.0059	0.0023	0.00008	9.6e-05	7.1e-06
3A - Mix/Load Liquids - ATV Groundboom	Artichokes	1.0	40	0.7	0.0048	0.0018	0.00007	7.7e-05	5.6e-06
3B - Spray Application - ATV Groundboom				0.4	0.0030	0.0011	0.00004	4.8e-05	3.5e-06
4A - Mix/Load Liquids for Aerial Application	Fallow beds	0.25	350	1.5	0.011	0.0039	0.00015	1.7e-04	1.2e-05
4B - Spray Application - Fixed-Wing Aircraft				ND - Double layer PPE is not worn for aerial application.					
4C - Flag Aerial Applications				1.0	0.0031	0.0025	0.00004	1.0e-04	7.6e-06
5 - Mix/Load Liquids for Chemigation	Onions, Garlic, Horseradish	0.25	350	1.5	0.011	0.0039	0.00015	1.7e-04	1.2e-05
6A - Mix/Load Liquids - Right of Way Sprayer	Right of Way Areas	1.0	25	0.4	0.0030	0.0011	0.00004	4.8e-05	3.5e-06
6B - Spray Application - Right of Way Sprayer				7.3	0.010	0.0186	0.00014	7.7e-04	5.7e-05
7 - Mix/Load/Apply Liquids - Backpack	Conifers	1.0	2	3.2	0.0060	0.0082	0.00009	3.4e-04	2.5e-05
7 - Mix/Load/Apply Liquids - Backpack	Conifers	0.375	2	1.2	0.0023	0.0031	0.00003	1.3e-04	9.4e-06
8A - ATV Drawn Broadcast Spreader - Load	Ornamentals	1.0	40	0.1	0.0068	0.0004	0.00010	1.8e-05	1.3e-06
8B - ATV Drawn Broadcast Spreader - Apply	Ornamentals	1.0	40	0.2	0.0048	0.0004	0.00007	2.1e-05	1.5e-06
9 - Push Type Broadcast Spreader(Load/Apply)	Ornamentals	1.0	5	3.7	0.0032	0.0094	0.00005	3.9e-04	2.8e-05
10 - Spoon	Ornamentals	1.0	1	No data for this scenario.					

Notes

a Daily Exposure (mg/day) = Application Rate (lb ai/Acre) * Treated Area (Acre/day) * Unit Exposure Value (mg or µg exposure/ lb ai handled) *[1mg/1000µg (conversion factor if necessa

b Absorbed Daily Dose (mg/kg/day) = Daily Exposure (mg/day) * Absorption Factor (0.18 for dermal; 1.0 for inhalation) ÷ Body Weight (70kg).

c Combined Lifetime Averaged Daily Dose (mg/kg/day) = Combined Potential Daily Dose (see note below) * 30 Annual Treatment Days / 365 days per year * 35 years working / 70 year life
Note - Combined Potential Daily Dose (mg/kg/day) = Dermal Potential Daily Dose (mg/kg/day) + Inhalation Potential Daily Dose (mg/kg/day).

d Carcinogenic Risk = Combined Lifetime Averaged Daily Dose (mg/kg/day) * Q_1^* $(mg/kg/day)^{-1}$. Q_1^* = 0.073 for Oxyfluorfen.
Carcinogenic risks of 1.0×10^{-6} or lower are below the Agency's level of concern. Carcinogenic risks in the 1.0×10^{-6} to 1.0×10^{-4} range should be reduced, when feasible, via mitigation m

Table B11: Engineering Controls Worker Oxyfluorfen Exposure and Cancer Risks

Exposure Scenario	Crops	Application Rates (lb ai/Acre)	Treated Areas (Acres/day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Lifetime Absorbed Daily Dose (mg/kg/day)[c]	Cancer Risk[d]
				Dermal	Inhalation	Dermal	Inhalation		
1A - Mix/Load Liquids - Large Groundboom	Field/Row Crops (Onions, Cotton)	1.0	80	0.69	0.0066	1.8e-03	9.5e-05	7.7e-05	5.6e-06
1B - Spray Application - Large Groundboom				0.40	0.0034	1.0e-03	4.9e-05	4.4e-05	3.2e-06
2A - Mix/Load Liquids - Small Groundboom	Orchard/Vineyard Floors, Nursery Trees	1.0	80	0.69	0.0066	1.8e-03	9.5e-05	7.7e-05	5.6e-06
2B - Spray Application - Small Groundboom				0.40	0.0034	1.0e-03	4.9e-05	4.4e-05	3.2e-06
3A - Mix/Load Liquids - ATV Groundboom	Artichokes	1.0	40	0.34	0.0033	8.8e-04	4.7e-05	3.8e-05	2.8e-06
3B - Spray Application - ATV Groundboom				0.20	0.0017	5.1e-04	2.5e-05	2.2e-05	1.6e-06
4A - Mix/Load Liquids for Aerial Application	Fallow beds	0.25	350	0.75	0.0073	1.9e-03	1.0e-04	8.4e-05	6.1e-06
4B - Spray Application - Fixed-Wing Aircraft				See calculations for single layer PPE which assumes a closed cockpit.					
4C - Flag Aerial Applications				0.02	0.0006	5.0e-05	8.8e-06	2.4e-06	1.8e-07
5 - Mix/Load Liquids for Chemigation	Onions, Garlic, Horseradish	0.25	350	0.75	0.0073	1.9e-03	1.0e-04	8.4e-05	6.1e-06
6A - Mix/Load Liquids - Right of Way Sprayer	Right of Way Areas	1.0	25	0.22	0.0021	5.5e-04	3.0e-05	2.4e-05	1.8e-06
6B - Spray Application - Right of Way Sprayer				No Data for This Scenario					
7 - Mix/Load/Apply Liquids - Backpack	Conifers	1.0	2	No Data for This Scenario					
7 - Mix/Load/Apply Liquids - Backpack	Conifers	0.375	2	No Data for This Scenario					
8A - ATV Drawn Broadcast Spreader - Load	Ornamentals	1.0	40	0.0068	0.0014	1.7e-05	1.9e-05	1.5e-06	1.1e-07
8B - ATV Drawn Broadcast Spreader - Apply	Ornamentals	1.0	40	0.084	0.0088	2.2e-04	1.3e-04	1.4e-05	1.0e-06

Exposure Scenario	Crops	Application Rates (lb ai/Acre)	Treated Areas (Acres/day)	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Lifetime Absorbed Daily Dose (mg/kg/day)[c]	Cancer Risk[d]
				Dermal	Inhalation	Dermal	Inhalation		
9 - Push Type Broadcast Spreader(Load/Apply)	Ornamentals	1.0	5	No Data for This Scenario					
10 - Spoon	Ornamentals	1.0	1	No Data for This Scenario					

Notes

a Daily Exposure (mg/day) = Application Rate (lb ai/Acre) * Treated Area (Acre/day) * Unit Exposure Value (mg or µg exposure/ lb ai handled) *[1mg/1000µg (conversion factor if necessa

b Absorbed Daily Dose (mg/kg/day) = Daily Exposure (mg/day) * Absorption Factor (0.18 for dermal; 1.0 for inhalation) ÷ Body Weight (70kg).

c Combined Lifetime Averaged Daily Dose (mg/kg/day) = Combined Potential Daily Dose (see note below) * 30 Annual Treatment Days / 365 days per year * 35 years working / 70 year life
Note - Combined Potential Daily Dose (mg/kg/day) = Dermal Potential Daily Dose (mg/kg/day) + Inhalation Potential Daily Dose (mg/kg/day).

d Carcinogenic Risk = Combined Lifetime Averaged Daily Dose (mg/kg/day) * Q_1^* $(mg/kg/day)^{-1}$. Q_1^* = 0.073 for Oxyfluorfen.
Carcinogenic risks of 1.0×10^{-6} or lower are below the Agency's level of concern. Carcinogenic risks in the 1.0×10^{-6} to 1.0×10^{-4} range should be reduced, when feasible, via mitigation m

Table B12: Summary of Oxyfluorfen Occupational Exposure Scenarios and Non-Cancer Risks

Exposure Scenario	Application Rate[a] (lbs ai/acre)	Treated Area[b] (acres/day)	Baseline PPE[c] MOE[e] Short | Intermediate Term		Single Layer w/o Respirator[d] MOE[e] Short | Intermediate Term	
1A - Mix/Load Liquids - Large Groundboom	2.0	200	**8.6**	11.0	840	900
1B - Spray Application - Large Groundboom			1400	1700	1400	1500
2A - Mix/Load Liquids - Small Groundboom	2.0	80	**22**	**27**	2100	2200
2B - Spray Application - Small Groundboom			3450	4300	3500	3700
3A - Mix/Load Liquids - ATV Groundboom	2.0	40	**43**	**54**	4200	4500
3B - Spray Application - ATV Groundboom			6900	8600	6900	7400
4A - Mix/Load Liquids for Aerial Application	0.25	1200	**5.7**	**7.1**	560	600
4B - Spray Application - Aerial			3100	3900	N/A	N/A
4C - Flag Aerial Applications			1300	1600	1200	1300
5 - Mix/Load for Chemigation	0.5	350	**20**	**24**	1900	2100
6A - Mix/Load Liquids - Right of Way Sprayer	2.0	50	**69**	**86**	6700	7200
6B - Spray Application - Right of Way Sprayer			150	**190**	490	520
7 - Mix/Load/Apply Liquids - Backpack	2.0	2	ND	ND	940	1000
7 - Mix/Load/Apply Liquids - Backpack	0.375	2	ND	ND	5000	5300
8A - ATV Drawn Broadcast Spreader - Load	2.0	40	7000	8700	7600	8200
8B - ATV Drawn Broadcast Spreader - Apply	2.0	40	7500	9400	9000	9600
9 - Load and Apply Using Broadcast Spreader	2.0	5	340	420	750	800
10- Spoon Application	2.0	1	ND	ND	2200	2400

Notes:

a Application rates are the maximum values listed on the labels.

b Amounts of acreage treated per day are from the HED Science Advisory Council for Exposure Policy #009 " Standard Values for Daily Acres Treated in Agriculture"

c Baseline PPE - long pants, long sleeved shirt, no gloves, no respirator.

d Single Layer PPE - chemical resistant gloves, long pants, long sleeved shirt, hat and no respirator.

e MOE (unitless) = NOAEL (mg/kg/day) ÷ Combined Absorbed Daily Dose (mg/kg/day). Where NOAEL = 30 mg/kg/day for short-term and 32 mg/kg/day for intermediate-term exposures. A Margin of Exposure (MOE) of 100 or greater is acceptable for short term exposures. A MOE of 300 is acceptable for intermediate term exposures.

Table B13: Summary of Oxyfluorfen Cancer Risks for Custom Applicators

(Assuming 30 Days of Exposure per Year)

Exposure Scenario	Application Rate[a] (lb ai/Acre)	Treated Area[b] (Acres/day)	Single Layer[c] Cancer Risk[h]	Double Layer [d] Cancer Risk[h]	Double Layer PF5[e] Cancer Risk[h]	Double Layer PF10[f] Cancer Risk[h]	Engineering Controls [g] Cancer Risk[h]
1A - Mix/Load Liquids - Large Groundboom	1.0	80	1.8e-05	1.5e-05	1.2e-05	1.1e-05	5.6e-06
1B - Spray Application - Large Groundboom			1.1e-05	9.4e-06	7.3e-06	7.1e-06	3.2e-06
2A - Mix/Load Liquids - Small Groundboom	1.0	80	1.8e-05	1.5e-05	1.2e-05	1.1e-05	5.6e-06
2B - Spray Application - Small Groundboom			1.1e-05	9.4e-06	7.3e-06	7.1e-06	3.2e-06
3A - Mix/Load Liquids - ATV Groundboom	1.0	40	9.2e-06	7.5e-06	5.8e-06	5.6e-06	2.8e-06
3B - Spray Application - ATV Groundboom			5.6e-06	4.7e-06	3.7e-06	3.5e-06	1.6e-06
4A - Mix/Load Liquids for Aerial Application	0.25	350	2.0e-05	1.6e-05	1.3e-05	1.2e-05	6.1e-06
4B - Spray Application - Aerial			3.6e-06	N/A	N/A	N/A	N/A
4C - Flag Aerial Applications			9.4e-06	8.8e-06	7.7e-06	7.6e-06	1.8e-07
5 - Chemigation	0.25	350	2.0e-05	1.6e-05	1.3e-05	1.2e-05	6.1e-06
6A - Mix/Load Liquids - Right of Way Sprayer	1.0	50	5.7e-06	4.7e-06	3.6e-06	3.5e-06	1.8e-06
6B - Spray Application - Right of Way Sprayer			8.0e-05	6.0e-05	5.7e-05	5.7e-05	ND
7 - Mix/Load/Apply Liquids - Backpack	1.0	2	4.1e-05	2.7e-05	2.5e-05	2.5e-05	ND
7 - Mix/Load/Apply Liquids - Backpack	0.375	2	1.5e-05	1.0e-05	9.5e-06	9.4e-06	ND
8A - ATV Drawn Broadcast Spreader - Load	2.0	40	5.1e-06	4.0e-06	1.6e-06	1.3e-06	1.1e-07
8B - ATV Drawn Broadcast Spreader - Apply	2.0	40	4.3e-06	3.4e-06	1.7e-06	1.5e-06	1.0e-06
9 - Load and Apply Using Broadcast Spreader	1.0	5	5.2e-05	3.0e-05	2.9e-05	2.8e-05	ND
10 - Spoon Application	1.0	1	1.7e-05	ND	ND	ND	ND

Notes:

a Application rates are the average values found in the Oxyfluorfen Use Closure Memo.

b Amounts of acreage treated per day are from the HED Science Advisory Council for Exposure Policy #009 " Standard Values for Daily Acres Treated in Agriculture"

c Single Layer - chemical resistant gloves, long pants, long sleeved shirt, hat and no respirator.

d Double Layer - coveralls over single layer clothing, chemical resistant gloves .

e Double Layer PF5 - Same as above with a PF5 Dust/mist respirator or dust mask

f. Double Layer PF10 - Same as above with a PF10 half face cartridge respirator

g Engineering Controls - Includes closed mixing/loading and/or enclosed cab application

h Carcinogenic Risk = Lifetime Averaged Daily Dose (mg/kg/day) * Q_1^* $(mg/kg/day)^{-1}$. Q_1^* = 0.0732 for Oxyfluorfen.
Carcinogenic risks of 1.0 x 10^{-6} or lower are below the Agency's level of concern. Carcinogenic risks in the 1.0 x 10^{-6} to 1.0 x 10^{-4} range should be reduced.

Table B14: Summary of Oxyfluorfen Cancer Risks for Private Growers

(Assuming 10 Days Exposure per Year)

Exposure Scenario	Application Rate[a] (lb ai/Acre)	Treated Area[b] (Acres/day)	Single Layer [c] Cancer Risk[h]	Double Layer[d] Cancer Risk[h]	Double Layer PF5[e] Cancer Risk[h]	Double Layer PF10[f] Cancer Risk[h]	Engineering Controls [g] Cancer Risk[h]
1A - Mix/Load Liquids - Large Groundboom	1.0	200	6.0e-06	5.0e-06	4.0e-06	3.7e-06	1.9e-06
1B - Spray Application - Large Groundboom			3.7e-06	3.1e-06	2.4e-06	2.4e-06	1.1e-06
2A - Mix/Load Liquids - Small Groundboom	1.0	80	6.0e-06	5.0e-06	4.0e-06	3.7e-06	1.9e-06
2B - Spray Application - Small Groundboom			3.7e-06	3.1e-06	2.4e-06	2.4e-06	1.1e-06
3A - Mix/Load Liquids - ATV Groundboom	1.0	40	3.1e-06	2.5e-06	1.9e-06	1.9e-06	9.3e-07
3B - Spray Application - ATV Groundboom			1.9e-06	1.6e-06	1.2e-06	1.2e-06	5.3e-07
4A - Mix/Load Liquids for Aerial Application	ND - Aerial application is rarely done by private growers because of the high cost of maintaining an airplane. It is usually done by custom applicators.						
4B - Spray Application - Aerial							
4C - Flag Aerial Applications							
5 - Mix/Load Liquids for Chemigation	0.25	350	6.7e-06	5.3e-06	4.3e-06	4.0e-06	2.0e-06
6A - Mix/Load Liquids - Right of Way Sprayer	Right of Way of sprayers are not typically used by private growers. Are typically used by state transportation department employees or contractors.						
6B - Spray Application - Right of Way Sprayer							
7 - Mix/Load/Apply Liquids - Backpack	1.0	2	1.4e-05	9.0e-06	8.3e-06	8.3e-06	ND
7 - Mix/Load/Apply Liquids - Backpack	0.375	2	4.9e-06	3.3e-06	3.2e-06	3.1e-06	ND
8A - ATV Drawn Broadcast Spreader - Load	2.0	40	1.7e-06	1.3e-06	5.3e-07	4.3e-07	3.7e-08
8B - ATV Drawn Broadcast Spreader - Apply	2.0	40	1.4e-06	1.1e-06	5.7e-07	5.0e-07	3.3e-07
9 - Load and Apply Using Broadcast Spreader	1.0	5	1.7e-05	1.0e-05	9.7e-06	9.3e-06	ND
10 - Spoon Application	1.0	1	5.7e-06	ND	ND	ND	ND

Notes:

a Application rates are the average values found in the Oxyfluorfen Use Closure Memo.

b Amounts of acreage treated per day are from the HED Science Advisory Council for Exposure Policy #009 " Standard Values for Daily Acres Treated in Agriculture"

c Single Layer - chemical resistant gloves, long pants, long sleeved shirt, hat and no respirator.

d Double Layer - coveralls over single layer clothing, chemical resistant gloves .

e Double Layer PF5 - Same as above with a PF5 Dust/mist respirator or dust mask

f. Double Layer PF10 - Same as above with a PF10 half face cartridge respirator

g Engineering Controls - Includes closed mixing/loading and/or enclosed cab application

h Carcinogenic Risk = Lifetime Averaged Daily Dose (mg/kg/day) * Q_1^* $(mg/kg/day)^{-1}$. Q_1^* = 0.0732 for Oxyfluorfen.
Carcinogenic risks of 1.0 x 10^{-6} or lower are below the Agency's level of concern. Carcinogenic risks in the 1.0 x 10^{-6} to 1.0 x 10^{-4} range should be reduced.

APPENDIX C

OXYFLUORFEN
POST APPLICATION WORKER
EXPOSURE AND RISK ASSESSMENT TABLES

Table C1 - Summary of Oxyfluorfen Worker Post Application Risks (Non-Cancer Short and Intermediate Term)

Crop Type (Specific Crops)	Input Parameters Used	Application Rate (lbs ai/acre)	Post Application Exposures	Transfer Coefficient (cm^2/hr)	Short Term MOE on DAT 0	DAT When Short Term MOE >100	Intermediate Term MOE on DAT 0	DAT When Intermediate Term MOE >300
Bulb Vegetables (Garlic, Onions, Taro)	Default[1]	0.5	Irrigation, scouting, weeding, thinning immature plants Same as above with mature plants	300 1500	3700 740	0 0	4600 920	0 0
Tree Seedlings, Conifer	Default[1/]	1.0	Irrigation, scouting, hand weeding escaped weeds	1000	560	0	690	0
Tree Seedlings, Conifer	Study Data[2]	1.0	Irrigation, scouting, hand weeding escaped weeds	1000	170	0	193	1
Trees, Conifers	Default[1]	2.0	Irrigation, scouting Shearing	1000 3000	280 93	0 1	350 120	0 10
Trees, Conifers	Default[1]	0.375	Irrigation, scouting Shearing	1000 3000	1500 500	0 0	1800 620	0 0
Trees, Conifers	Study Data[2]	2.0	Irrigation, scouting Shearing	1000 3000	83 28	1 1	97 32	1 1
Trees, Conifers	Study Data[2]	0.375	Irrigation, scouting Shearing	1000 3000	440 150	0 0	520 170	0 1

1. Default parameters are 20% of amount applied deposits on the foliage and dissipates at a rate of 10% per day.
2. Data from MRID 420983-01 indicates a deposition rate of 76.5% and dissipation rates of 90% for day 0 to day 1 and 37% after day 1.

Table C2 - Summary of Oxyfluorfen Worker Post Application Cancer Risks (30 days exposure per year)

Crop Type (Specific Crops)	Input Parameters Used	Application Rate (lbs ai/acre)	Activity	Transfer Coefficient (cm^2/hr)	Cancer Risk on DAT 0	DAT When Cancer Risk <1.0e-04	DAT When Cancer Risk <1.0e-06
Bulb Vegetables (Garlic, Onions, Taro)	Default	0.25	Irrigation, scouting, weeding, thinning immature plants Irrigation and scouting mature plants	300 1500	1.0e-05 5.2e-05	0 0	23 38
Tree Seedlings, Conifer	Default	0.5	Irrigation, scouting, hand weeding escaped weeds	1000	6.9e-05	0	41
Tree Seedlings, Conifer	Study Data	0.5	Irrigation, scouting, hand weeding escaped weeds	1000	2.4e-04	1	11
Trees, Conifer	Default	1.0	Irrigation, scouting Shearing	1000 3000	1.4e-04 4.2e-04	4 14	47 58
Trees, Conifer	Default	0.375	Irrigation, scouting Shearing	1000 3000	5.2e-05 1.6e-04	0 5	38 48
Trees, Conifer	Study Data	1.0	Irrigation, scouting Shearing	1000 3000	4.8e-04 1.4e-03	1 2	10 12
Trees, Conifer	Study Data	0.375	Irrigation, scouting Shearing	1000 3000	1.8e-04 5.4e-04	1 1	8 10

Table C3 - Summary of Private Grower Oxyfluorfen Post Application Cancer Risks (10 days exposure per year)

Crop Type (Specific Crops)	Input Parameters	Application Rate (lbs ai/acre)	Activity	Transfer Coefficient (cm^2/hr)	Cancer Risk on DAT 0	DAT When Cancer Risk <1.0e-04	DAT When Cancer Risk <1.0e-06
Bulb Vegetables (Garlic, Onions, Taro)	Default	0.25	Irrigation, scouting, weeding, thinning immature plants Irrigation and scouting mature plants	300 1500	3.5e-06 1.7e-05	0 0	12 28
Tree Seedlings, Conifer	Default	0.5	Irrigation, scouting, hand weeding escaped weeds	1000	2.3e-05	0	30
Tree Seedlings, Conifer	Study Data	0.5	Irrigation, scouting, hand weeding escaped weeds	1000	7.9e-05	0	6
Trees, Conifer	Default	1.0	Irrigation, scouting Shearing	1000 3000	4.6e-05 1.4e-04	0 4	37 47
Trees, Conifer	Default	0.375	Irrigation, scouting Shearing	1000 3000	1.7e-05 5.2e-05	0 0	28 38
Trees, Conifer	Study Data	1.0	Irrigation, scouting Shearing	1000 3000	1.6e-04 4.8e-04	1 1	7 12
Trees, Conifer	Study Data	0.375	Irrigation, scouting Shearing	1000 3000	6.0e-05 1.8e-04	0 1	5 8

APPENDIX D

OXYFLUORFEN
RESIDENTIAL HANDLER
EXPOSURE AND RISK
ASSESSMENT TABLES

Table D1: Numerical Inputs for Residential Applicator Exposure to Oxyfluorfen

Exposure Scenario	Area Treated (SF)	Amount of Oxyfluorfen Used	Application rate	Unit Exposure Values	
				Dermal[d] (mg/lb ai handled)	Inhalation[e] (µg/lb ai handled)
(1) Spot Treat Weeds Using Low Pressure Tank Sprayer (Kleenup Super Edger)[a]	300	0.022 lb Ai	0.022 lb ai/ 300 SF	38	30
(2) Spot Treat Weeds Using Mix Your Own Sprinkler Can[b] (Ortho Groundclear Triox)	200	0.041 lb Ai	0.041 lb Ai/ 200 SF	11	16
(3) Spot Treat Weeds Using RTU Invert Jug[c] (Ortho Groundclear SuperEdger)	200	0.022 lb Ai	0.022 lb Ai/ 200 SF	2.6	11
(4) Spot Treat Weeds Using a RTU Trigger Pump Sprayer (Kleen up Super Edger)	200	0.022 lb Ai	0.022 lb ai/ 200 sf	53	67

a. Using one gallon of pre-mixed solution which contains 0.25% Oxyfluorfen or 0.022 lbs Oxyfluorfen per gallon..
b. Concentrate containing 0.70% Oxyfluorfen. 2.67 quarts of concentrate are mixed with 3.0 gallons of water to treat 200 SF.
c. The RTU Invert Jug has a built-in applicator which is activated by removing the cap and inverting the jug. One gallon covers 200 SF.
d. Dermal unit exposure represents an individual's estimated exposure while wearing short pants, short sleeved shirt and no gloves.
e. Inhalation unit exposure represents no use of a respirator.

Table D2: Exposure and Non-Cancer Risks for Residential Application of Oxyfluorfen

Exposure Scenario	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Absorbed Daily Dose (mg/kg/day)[c]	Combined MOE[d,e]
	Dermal	Inhalation	Dermal	Inhalation		
(1) Spot Treat Weeds Using Low Pressure Tank Sprayer	0.84	6.6e-04	2.5e-03	1.1e-05	2.5e-03	11909
(2) Spot Treat Weeds Using Mix Your Own Sprinkler Can	0.45	6.6e-04	1.4e-03	1.1e-05	1.4e-03	21995
(3) Spot Treat Weeds Using RTU Invert Jug	0.057	2.4e-04	1.7e-04	4.0e-06	1.8e-04	170810
(4) Spot Treat Weeds Using a RTU Trigger Pump Sprayer	1.2	1.5e-03	3.5e-03	2.5e-05	3.5e-03	8517

a. Daily Exposure = Amount of Ai Used * Unit Exposure Value * Conversion Factor (if necessary)
(mg/day) (lb/day) (mg or *u*g/lb ai handled) (1 mg/1000 ug)

b. Absorbed Daily Dose = Daily Exposure * Absorption Factor (0.18 for dermal, 1.0 for inhalation) / Body Weight (60 kg)
(mg/kg/day) (mg/day)

c. Combined Absorbed Daily Dose (CADD) = Dermal Absorbed Daily Dose + Inhalation Absorbed Daily Dose
(mg/kg/day) (mg/kg/day) (mg/kg/day)

d. MOE = NOAEL (mg/kg/day)/CADD (mg/kg/day). Where NOAEL = 30 mg/kg/day for short term exposures.

e. A Margin of Exposure (MOE) of 100 or greater is acceptable for Oxyfluorfen.

Table D3: Exposure and Cancer Risks for Residential Application of Oxyfluorfen Assuming two treatment days of exposure per year)

Exposure Scenario	Daily Exposure (mg/day)[a]		Absorbed Daily Dose (mg/kg/day)[b]		Combined Absorbed Daily Dose (mg/kg/day)[c]	LADD (mg/kg/day)[d]	Cancer Risk[e,f]
	Dermal	Inhalation	Dermal	Inhalation			
(1) Spot Treat Weeds Using Low Pressure Tank Sprayer	0.84	0.00066	2.2e-03	9.4e-06	2.2e-03	8.5e-06	6.2e-07
(2) Spot Treat Weeds Using Mix Your Own Sprinkler Can	0.45	0.00066	1.2e-03	9.4e-06	1.2e-03	4.6e-06	3.3e-07
(3) Spot Treat Weeds Using RTU Invert Jug	0.057	0.00024	1.5e-04	3.5e-06	1.5e-04	5.9e-07	4.3e-08
(4) Spot Treat Weeds Using RTU Trigger Pump Sprayer	1.2	0.00147	3.0e-03	2.1e-05	3.0e-03	1.2e-05	8.7e-07

a. Same as in Table D2 above.

b. Same as in Table D2 except that a body weight of 70 kg was used instead of 60 kg.

c. Combined Absorbed Daily Dose (CADD) = Dermal Absorbed Daily Dose + Inhalation Absorbed Daily Dose
(mg/kg/day) (mg/kg/day) (mg/kg/day)

d. Lifetime Averaged Daily Dose (LADD) = CADD * (2 Annual Treatment Days/365 days per year)*(50 years exposure/70 year lifespan)
(mg/kg/day)

e. Cancer Risk = LADD (mg/kg/day)*Q_1* (mg/kg/day)$^{-1}$. Q_1* = 0.0732 for Oxyfluorfen.

f. Cancer risks less than 1.0 X 10^{-6} are below HED's level of concern.

Table D4: Residential Exposure Scenario Description for the Use of Oxyfluorfen

Exposure Scenario	Data Source	Operation Sampled	Data Confidence[A]
(1) Spot Treat Weeds Using Low Pressure Tank Sprayer	MRID 444598-01	Residential Applicator Hand Held Pump Spray	High Confidence: Dermal Replicates = 20, A grade. Hand replicates = 20, A grade. Inhalation = 40 replicates, A grade
(2) Spot Treat Weeds Using Mix Your Own Sprinkler Can	ORETF[a] Study # OMA004	Residential Applicator, Hose End Sprayer, Mix your own	High Confidence: Dermal Replicates = 30, A grade. Hand replicates = 30, A grade. Inhalation = 30 replicates, A grade
(3) Spot Treat Weeds Using RTU Invert Jug		Residential Applicator, Hose End Sprayer, Ready to Use (no mixing)	High Confidence: Dermal Replicates = 30, A grade. Hand replicates = 30, A grade. Inhalation = 30 replicates, A grade

Exposure Scenario	Data Source	Operation Sampled	Data Confidence[A]
(4) Spot Treat Weeds Using RTU Trigger Sprayer	MRID 444598-01	Residential Applicator, RTU Trigger Sprayer	See above for scenario #1.

a. Occupational Residential Exposure Task Force

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical: Oxyfluorfen
Reason: Non-Cancer, Intermediate Term Risk Using Default Data
Transfer Coefficient Group: Root Vegetables
Specific Crop(s) Considered: Garlic, Onions, Taro
Application Rate of Crop (lb ai/A): 0.5

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	0	Initial Percent of Rate as DFR (%):	20
Source:	N/A	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	N/A	Uncertainty Factor:	100
[Initial] (ug/cm2):	N/A	NOAEL (mg/kg/day):	30
Study Application Rate (lb ai/A):	0.5	Source of NOAEL:	Oral Tox Study
Limit of Quantification (ug/cm2):	N/A	Adult Exposure Duration (hrs/day):	8
[Note: Enter application rate of crop if no data available in study rate cell.]		Adult Body Weight (kg):	60
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	N/A	N/A	N/A
Low	300	140 to 290	Irrigation, scouting, thinning, immature plants
Medium	1500	486 to 2760	Irrigation and scouting mature plants

Comments

Garlic: Can damage plants. Plant must have at least 2-3 leaves at first application to prevent injury. PHI = 60 days.
Onion: Similiar to garlic except that PHI is 45 days.

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		MOE	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	1.122	1.122	0.0081	0.0404	3714	743
1	1.010	1.010	0.0073	0.0363	4127	825
2	0.909	0.909	0.0065	0.0327	4585	917
3	0.818	0.818	0.0059	0.0294	5095	1019
4	0.736	0.736	0.0053	0.0265	5661	1132
5	0.662	0.662	0.0048	0.0238	6290	1258
6	0.596	0.596	0.0043	0.0215	6988	1398
7	0.537	0.537	0.0039	0.0193	7765	1553
8	0.483	0.483	0.0035	0.0174	8628	1726
9	0.435	0.435	0.0031	0.0156	9586	1917
10	0.391	0.391	0.0028	0.0141	10652	2130

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical: Oxyfluorfen
Reason: Non-Cancer, Intermediate Term Risk Using Default Data
Transfer Coefficient Group: Root Vegetables
Specific Crop(s) Considered: Garlic, Onions, Taro
Application Rate of Crop (lb ai/A): 0.5

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	0	Initial Percent of Rate as DFR (%):	20
Source:	N/A	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	N/A	Uncertainty Factor:	100
[Initial] (ug/cm2):	N/A	NOAEL (mg/kg/day):	32
Study Application Rate (lb ai/A):	0.5	Source of NOAEL:	Oral Tox Study
Limit of Quantification (ug/cm2):	N/A	Adult Exposure Duration (hrs/day):	8
[Note: Enter application rate of crop if no data available in study rate cell.]		Adult Body Weight (kg):	70
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	N/A	N/A	N/A
Low	300	140 to 290	Irrigation, scouting, thinning, immature plants
Medium	1500	486 to 2760	Irrigation and scouting mature plants

Comments

Garlic: Can damage plants. Plant must have at least 2-3 leaves at first application to prevent injury. PHI = 60 days.
Onion: Similiar to garlic except that PHI is 45 days.

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		MOE	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	1.122	1.122	0.0069	0.0346	4622	924
1	1.010	1.010	0.0062	0.0312	5135	1027
2	0.909	0.909	0.0056	0.0280	5706	1141
3	0.818	0.818	0.0050	0.0252	6340	1268
4	0.736	0.736	0.0045	0.0227	7044	1409
5	0.662	0.662	0.0041	0.0204	7827	1565
6	0.596	0.596	0.0037	0.0184	8697	1739
7	0.537	0.537	0.0033	0.0166	9663	1933
8	0.483	0.483	0.0030	0.0149	10737	2147
9	0.435	0.435	0.0027	0.0134	11930	2386
10	0.391	0.391	0.0024	0.0121	13255	2651

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical: Oxyfluorfen
Reason: Non-Cancer, Short Term Risk Using Default Data
Transfer Coefficient Group: Conifer Seedlings
Specific Crop(s) Considered: Conifer Seedlings
Application Rate of Crop (lb ai/A): 1

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults): 0
Source:
Slope of Semilog Regression:
[Initial] (ug/cm2):
Study Application Rate (lb ai/A): 1
Limit of Quantification (ug/cm2):
[Note: Enter application rate of crop if no data available in study rate cell.]

DFR Data Defaults and Toxicology Inputs

Initial Percent of Rate as DFR (%):	20
Dissipation Rate per day (%):	10
Uncertainty Factor:	100
NOAEL (mg/kg/day):	30
Source of NOAEL:	Oral Tox Study
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	60
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning

DAT	DFR LEVELS (ug/cm2)		Dose (mg/kg/day)	MOE
	Not Adjusted	Adjusted For Rate	Low Exposure	Low Exposure
0	2.244	2.244	0.0539	557
1	2.019	2.019	0.0485	619
2	1.817	1.817	0.0436	688
3	1.636	1.636	0.0393	764
4	1.472	1.472	0.0353	849
5	1.325	1.325	0.0318	943
6	1.192	1.192	0.0286	1048
7	1.073	1.073	0.0258	1165
8	0.966	0.966	0.0232	1294
9	0.869	0.869	0.0209	1438
10	0.782	0.782	0.0188	1598

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical:	Oxyfluorfen
Reason:	Non-Cancer, Short Term Risk Using Default Data
Transfer Coefficient Group:	Conifers
Specific Crop(s) Considered:	Christmas Trees
Application Rate of Crop (lb ai/A):	2

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	0	Initial Percent of Rate as DFR (%):	20
Source:	N/A	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	N/A	Uncertainty Factor:	100
[Initial] (ug/cm2):	N/A	NOAEL (mg/kg/day):	30
Study Application Rate (lb ai/A):	2	Source of NOAEL:	Oral Tox Study
Limit of Quantification (ug/cm2):	N/A	Adult Exposure Duration (hrs/day):	8
[Note: Enter application rate of crop if no data available in study rate cell.]		Adult Body Weight (kg):	60
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		MOE	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	4.488	4.488	0.1077	0.3231	279	93
1	4.039	4.039	0.0969	0.2908	309	103
2	3.635	3.635	0.0872	0.2617	344	115
3	3.271	3.271	0.0785	0.2355	382	127
4	2.944	2.944	0.0707	0.2120	425	142
5	2.650	2.650	0.0636	0.1908	472	157
6	2.385	2.385	0.0572	0.1717	524	175
7	2.146	2.146	0.0515	0.1545	582	194
8	1.932	1.932	0.0464	0.1391	647	216
9	1.739	1.739	0.0417	0.1252	719	240
10	1.565	1.565	0.0376	0.1127	799	266

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical:	Oxyfluorfen
Reason:	Non-Cancer, Short Term Risk Using Default Data
Transfer Coefficient Group:	Conifers
Specific Crop(s) Considered:	Christmas Trees Using Lower Rate for Chemical Mowing
Application Rate of Crop (lb ai/A):	0.375

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	0	Initial Percent of Rate as DFR (%):	20
Source:	N/A	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	N/A	Uncertainty Factor:	100
[Initial] (ug/cm2):	N/A	NOAEL (mg/kg/day):	30
Study Application Rate (lb ai/A):	0.375	Source of NOAEL:	Oral Tox Study
Limit of Quantification (ug/cm2):	N/A	Adult Exposure Duration (hrs/day):	8
[Note: Enter application rate of crop if no data available in study rate cell.]		Adult Body Weight (kg):	60
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		MOE	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	0.841	0.841	0.0202	0.0606	1486	495
1	0.757	0.757	0.0182	0.0545	1651	550
2	0.682	0.682	0.0164	0.0491	1834	611
3	0.613	0.613	0.0147	0.0442	2038	679
4	0.552	0.552	0.0132	0.0397	2264	755
5	0.497	0.497	0.0119	0.0358	2516	839
6	0.447	0.447	0.0107	0.0322	2795	932
7	0.402	0.402	0.0097	0.0290	3106	1035
8	0.362	0.362	0.0087	0.0261	3451	1150
9	0.326	0.326	0.0078	0.0235	3835	1278
10	0.293	0.293	0.0070	0.0211	4261	1420

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical: Oxyfluorfen
Reason: Non-Cancer, Intermediate Term Risk Using Default Data
Transfer Coefficient Group: Conifer Seedlings
Specific Crop(s) Considered: Conifer Seedlings
Application Rate of Crop (lb ai/A): 1

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults): 0
Source:
Slope of Semilog Regression:
[Initial] (ug/cm2):
Study Application Rate (lb ai/A): 1
Limit of Quantification (ug/cm2):
[Note: Enter application rate of crop if no data available in study rate cell.]

DFR Data Defaults and Toxicology Inputs

Initial Percent of Rate as DFR (%): 20
Dissipation Rate per day (%): 10
Uncertainty Factor: 100
NOAEL (mg/kg/day): 32
Source of NOAEL: Oral Tox Study
Adult Exposure Duration (hrs/day): 8
Adult Body Weight (kg): 70
Dermal Abs. (%): 18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning

DAT	DFR LEVELS (ug/cm2)		Dose (mg/kg/day)	MOE
	Not Adjusted	Adjusted For Rate	Low Exposure	Low Exposure
0	2.244	2.244	0.0462	693
1	2.019	2.019	0.0485	619
2	1.817	1.817	0.0436	688
3	1.636	1.636	0.0393	764
4	1.472	1.472	0.0353	849
5	1.325	1.325	0.0318	943
6	1.192	1.192	0.0286	1048
7	1.073	1.073	0.0258	1165
8	0.966	0.966	0.0232	1294
9	0.869	0.869	0.0209	1438
10	0.782	0.782	0.0188	1598

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical: Oxyfluorfen
Reason: Non-Cancer, Intermediate Term Risk Using Default Data
Transfer Coefficient Group: Conifers
Specific Crop(s) Considered: Christmas Trees
Application Rate of Crop (lb ai/A): 2

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	0	Initial Percent of Rate as DFR (%):	20
Source:	N/A	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	N/A	Uncertainty Factor:	100
[Initial] (ug/cm2):	N/A	NOAEL (mg/kg/day):	32
Study Application Rate (lb ai/A):	2	Source of NOAEL:	Oral Tox Study
Limit of Quantification (ug/cm2):	N/A	Adult Exposure Duration (hrs/day):	8
[Note: Enter application rate of crop if no data available in study rate cell.]		Adult Body Weight (kg):	70
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		MOE	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	4.488	4.488	0.0923	0.2769	347	116
1	4.039	4.039	0.0831	0.2493	385	128
2	3.635	3.635	0.0748	0.2243	428	143
3	3.271	3.271	0.0673	0.2019	475	158
4	2.944	2.944	0.0606	0.1817	528	176
5	2.650	2.650	0.0545	0.1635	587	196
6	2.385	2.385	0.0491	0.1472	652	217
7	2.146	2.146	0.0442	0.1325	725	242
8	1.932	1.932	0.0397	0.1192	805	268
9	1.739	1.739	0.0358	0.1073	895	298
10	1.565	1.565	0.0322	0.0966	994	331

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical: Oxyfluorfen
Reason: Non-Cancer, Intermediate Term Risk Using Default Data
Transfer Coefficient Group: Conifers
Specific Crop(s) Considered: Christmas Trees Using Lower Rate for Chemical Mowing
Application Rate of Crop (lb ai/A): 0.375

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	0	Initial Percent of Rate as DFR (%):	20
Source:	N/A	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	N/A	Uncertainty Factor:	100
[Initial] (ug/cm2):	N/A	NOAEL (mg/kg/day):	32
Study Application Rate (lb ai/A):	0.375	Source of NOAEL:	Oral Tox Study
Limit of Quantification (ug/cm2):	N/A	Adult Exposure Duration (hrs/day):	8
[Note: Enter application rate of crop if no data available in study rate cell.]		Adult Body Weight (kg):	70
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		MOE	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	0.841	0.841	0.0173	0.0519	1849	616
1	0.757	0.757	0.0156	0.0467	2054	685
2	0.682	0.682	0.0140	0.0421	2282	761
3	0.613	0.613	0.0126	0.0379	2536	845
4	0.552	0.552	0.0114	0.0341	2818	939
5	0.497	0.497	0.0102	0.0307	3131	1044
6	0.447	0.447	0.0092	0.0276	3479	1160
7	0.402	0.402	0.0083	0.0248	3865	1288
8	0.362	0.362	0.0075	0.0224	4295	1432
9	0.326	0.326	0.0067	0.0201	4772	1591
10	0.293	0.293	0.0060	0.0181	5302	1767

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical:	Oxyfluorfen
Reason:	Non-Cancer, Short Term Risk Using Study Data
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Seedlings
Application Rate of Crop (lb ai/A):	1

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	1	Initial Percent of Rate as DFR (%):	20
Source:	MRID 420983-01	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	-0.47	Uncertainty Factor:	100
[Initial] (ug/cm2):	0.98	NOAEL (mg/kg/day):	30
Day 1 (ug/cm2):	0.098	Source of NOAEL:	Oral Tox Study
Study Application Rate (lb ai/A):	0.13	Adult Exposure Duration (hrs/day):	8
Limit of Detection (ug/cm2):	0.011	Adult Body Weight (kg):	60
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	N/A	N/A	N/A
Low	1000	197 to 2302	Irrigation, scouting, hand weeding

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		MOE
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Medium Exposure	Low Exposure
0	0.9800	7.538	N/A	0.1809	166
1	0.0980	0.754	N/A	0.0181	1658
2	0.0613	0.471	N/A	0.0113	2653
3	0.0383	0.294	N/A	0.0071	4245
4	0.0239	0.184	N/A	0.0044	6792
5	0.0150	0.115	N/A	0.0028	10867

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical:	Oxyfluorfen
Reason:	Non-Cancer, Short Term Risk Using Study Data
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Trees
Application Rate of Crop (lb ai/A):	2

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	1	Initial Percent of Rate as DFR (%):	20
Source:	MRID 420983-01	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	-0.47	Uncertainty Factor:	100
[Initial] (ug/cm2):	0.98	NOAEL (mg/kg/day):	30
Day 1 (ug/cm2):	0.098	Source of NOAEL:	Oral Tox Study
Study Application Rate (lb ai/A):	0.13	Adult Exposure Duration (hrs/day):	8
Limit of Detection (ug/cm2):	0.011	Adult Body Weight (kg):	60
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	N/A	N/A	N/A
Low	1000	197 to 2302	Irrigation, scouting, hand weeding
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)			MOE	
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	0.9800	15.077	N/A	0.3618	1.0855	83	28
1	0.0980	1.508	N/A	0.0362	0.1086	829	276
2	0.0613	0.942	N/A	0.0226	0.0678	1327	442
3	0.0383	0.589	N/A	0.0141	0.0424	2122	707
4	0.0239	0.368	N/A	0.0088	0.0265	3396	1132
5	0.0150	0.230	N/A	0.0055	0.0166	5433	1811

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical:	Oxyfluorfen
Reason:	Non-Cancer, Short Term Risk Using Study Data
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Trees Using Lower Rate for Chemical Mowing
Application Rate of Crop (lb ai/A):	0.375

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	1	Initial Percent of Rate as DFR (%):	20
Source:	MRID 420983-01	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	-0.47	Uncertainty Factor:	100
[Initial] (ug/cm2):	0.98	NOAEL (mg/kg/day):	30
Day 1 (ug/cm2):	0.098	Source of NOAEL:	Oral Tox Study
Study Application Rate (lb ai/A):	0.13	Adult Exposure Duration (hrs/day):	8
Limit of Detection (ug/cm2):	0.011	Adult Body Weight (kg):	60
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	N/A	N/A	N/A
Low	1000	197 to 2302	Irrigation, scouting, hand weeding
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)			MOE	
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	0.9800	2.827	N/A	0.0678	0.2035	442	147
1	0.0980	0.283	N/A	0.0068	0.0204	4422	1474
2	0.0613	0.177	N/A	0.0042	0.0127	7075	2358
3	0.0383	0.110	N/A	0.0027	0.0080	11320	3773
4	0.0239	0.069	N/A	0.0017	0.0050	18111	6037
5	0.0150	0.043	N/A	0.0010	0.0031	28978	9659

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical:	Oxyfluorfen
Reason:	Non-Cancer, Intermediate Term Risk Using Study Data
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Seedlings
Application Rate of Crop (lb ai/A):	1

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	1	Initial Percent of Rate as DFR (%):	20
Source:	MRID 420983-01	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	-0.47	Uncertainty Factor:	100
[Initial] (ug/cm2):	0.98	NOAEL (mg/kg/day):	32
Day 1 (ug/cm2):	0.098	Source of NOAEL:	Oral Tox Study
Study Application Rate (lb ai/A):	0.13	Adult Exposure Duration (hrs/day):	8
Limit of Detection (ug/cm2):	0.011	Adult Body Weight (kg):	70
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	N/A	N/A	N/A
Low	1000	197 to 2302	Irrigation, scouting, hand weeding

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		MOE
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Medium Exposure	Low Exposure
0	0.9800	7.538	N/A	0.1551	206
1	0.0980	0.754	N/A	0.0155	2063
2	0.0613	0.471	N/A	0.0097	3302
3	0.0383	0.294	N/A	0.0061	5283
4	0.0239	0.184	N/A	0.0038	8452
5	0.0150	0.115	N/A	0.0024	13523

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical:	Oxyfluorfen
Reason:	Non-Cancer, Intermediate Term Risk Using Study Data
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Trees
Application Rate of Crop (lb ai/A):	2

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	1	Initial Percent of Rate as DFR (%):	20
Source:	MRID 420983-01	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	-0.47	Uncertainty Factor:	100
[Initial] (ug/cm2):	0.98	NOAEL (mg/kg/day):	32
Day 1 (ug/cm2):	0.098	Source of NOAEL:	Oral Tox Study
Study Application Rate (lb ai/A):	0.13	Adult Exposure Duration (hrs/day):	8
Limit of Detection (ug/cm2):	0.011	Adult Body Weight (kg):	70
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	N/A	N/A	N/A
Low	1000	197 to 2302	Irrigation, scouting, hand weeding
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)			MOE	
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	0.9800	15.08	N/A	0.3102	0.9305	97	32
1	0.0980	1.51	N/A	0.0310	0.0930	967	322
2	0.0613	0.94	N/A	0.0194	0.0582	1548	516
3	0.0383	0.59	N/A	0.0121	0.0363	2476	825
4	0.0239	0.37	N/A	0.0076	0.0227	3962	1321
5	0.0150	0.23	N/A	0.0047	0.0142	6339	2113

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Date: 08/15/01
Assessor: TD

Chemical:	Oxyfluorfen
Reason:	Non-Cancer, Intermediate Term Risk Using Study Data
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Trees Using Lower Rate for Chemical Mowing
Application Rate of Crop (lb ai/A):	0.375

DFR Data Summary		DFR Data Defaults and Toxicology Inputs	
Data Source (enter 1 if data available, 0 if defaults):	1	Initial Percent of Rate as DFR (%):	20
Source:	MRID 420983-01	Dissipation Rate per day (%):	10
Slope of Semilog Regression:	-0.47	Uncertainty Factor:	100
[Initial] (ug/cm2):	0.98	NOAEL (mg/kg/day):	32
Day 1 (ug/cm2):	0.098	Source of NOAEL:	Oral Tox Study
Study Application Rate (lb ai/A):	0.13	Adult Exposure Duration (hrs/day):	8
Limit of Detection (ug/cm2):	0.011	Adult Body Weight (kg):	70
		Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	N/A	N/A	N/A
Low	1000	197 to 2302	Irrigation, scouting, hand weeding
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)			MOE	
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	0.9800	2.83	N/A	0.0582	0.1745	516	172
1	0.0980	0.28	N/A	0.0058	0.0174	5159	1720
2	0.0613	0.18	N/A	0.0036	0.0109	8254	2751
3	0.0383	0.11	N/A	0.0023	0.0068	13206	4402
4	0.0239	0.07	N/A	0.0014	0.0043	21130	7043
5	0.0150	0.04	N/A	0.0009	0.0027	33808	11269

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical: Oxyfluorfen
Reason: Cancer Risk for Commercial Workers Using Default Inputs
Transfer Coefficient Group: Root Vegetables
Specific Crop(s) Considered: Garlic, Onions, Taro
Application Rate of Crop (lb ai/A): 0.25

DFR Data Summary

Data Source (enter 0 if defaults):	0
Study Application Rate (lb ai/A):	0.25

DFR Data Defaults:

Initial Percent of Rate as DFR (%):	20
Dissipation Rate per day (%):	10

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	N/A	N/A	N/A
Low	300	140 to 290	Irrigation, scouting, thinning, immatur
Medium	1500	486 to 2760	Irrigation and scouting mature plants

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	30
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Comments: See MOE Spreadsheet.

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		CANCER RISK	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Med Exposure
0	0.561	0.561	3.5E-003	1.7E-002	1.0E-005	5.2E-005
1	0.505	0.505	3.1E-003	1.6E-002	9.4E-006	4.7E-005
2	0.454	0.454	2.8E-003	1.4E-002	8.4E-006	4.2E-005
3	0.409	0.409	2.5E-003	1.3E-002	7.6E-006	3.8E-005
4	0.368	0.368	2.3E-003	1.1E-002	6.8E-006	3.4E-005
5	0.331	0.331	2.0E-003	1.0E-002	6.1E-006	3.1E-005
6	0.298	0.298	1.8E-003	9.2E-003	5.5E-006	2.8E-005
7	0.268	0.268	1.7E-003	8.3E-003	5.0E-006	2.5E-005
8	0.241	0.241	1.5E-003	7.5E-003	4.5E-006	2.2E-005
9	0.217	0.217	1.3E-003	6.7E-003	4.0E-006	2.0E-005
10	0.196	0.196	1.2E-003	6.0E-003	3.6E-006	1.8E-005
11	0.176	0.176	1.1E-003	5.4E-003	3.3E-006	1.6E-005
12	0.158	0.158	9.8E-004	4.9E-003	2.9E-006	1.5E-005
13	0.143	0.143	8.8E-004	4.4E-003	2.6E-006	1.3E-005
14	0.128	0.128	7.9E-004	4.0E-003	2.4E-006	1.2E-005
15	0.115	0.115	7.1E-004	3.6E-003	2.1E-006	1.1E-005
16	0.104	0.104	6.4E-004	3.2E-003	1.9E-006	9.6E-006
17	0.094	0.094	5.8E-004	2.9E-003	1.7E-006	8.7E-006
18	0.084	0.084	5.2E-004	2.6E-003	1.6E-006	7.8E-006
19	0.076	0.076	4.7E-004	2.3E-003	1.4E-006	7.0E-006
20	0.068	0.068	4.2E-004	2.1E-003	1.3E-006	6.3E-006
21	0.061	0.061	3.8E-004	1.9E-003	1.1E-006	5.7E-006
22	0.055	0.055	3.4E-004	1.7E-003	1.0E-006	5.1E-006
23	0.050	0.050	3.1E-004	1.5E-003	9.2E-007	4.6E-006
24	0.045	0.045	2.8E-004	1.4E-003	8.3E-007	4.2E-006
25	0.040	0.040	2.5E-004	1.2E-003	7.5E-007	3.7E-006
26	0.036	0.036	2.2E-004	1.1E-003	6.7E-007	3.4E-006
27	0.033	0.033	2.0E-004	1.0E-003	6.1E-007	3.0E-006
28	0.029	0.029	1.8E-004	9.1E-004	5.5E-007	2.7E-006
29	0.026	0.026	1.6E-004	8.2E-004	4.9E-007	2.5E-006
30	0.024	0.024	1.5E-004	7.3E-004	4.4E-007	2.2E-006
31	0.021	0.021	1.3E-004	6.6E-004	4.0E-007	2.0E-006
32	0.019	0.019	1.2E-004	5.9E-004	3.6E-007	1.8E-006
33	0.017	0.017	1.1E-004	5.3E-004	3.2E-007	1.6E-006
34	0.016	0.016	9.6E-005	4.8E-004	2.9E-007	1.4E-006
35	0.014	0.014	8.7E-005	4.3E-004	2.6E-007	1.3E-006
36	0.013	0.013	7.8E-005	3.9E-004	2.3E-007	1.2E-006
37	0.011	0.011	7.0E-005	3.5E-004	2.1E-007	1.1E-006
38	0.010	0.010	6.3E-005	3.2E-004	1.9E-007	9.5E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Commercial Workers Using Default Inputs
Transfer Coefficient Group:	Root Vegetables
Specific Crop(s) Considered:	Onions, Garlic and Taro
Application Rate of Crop (lb ai/A):	0.25

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	0
Source:	N/A
Slope of Semilog Regression:	N/A
[Initial] (ug/cm2):	N/A
Study Application Rate (lb ai/A):	0.25
Limit of Quantification (ug/cm2):	N/A

[Note: Enter application rate of crop if no data available in study rate cell.]

DFR Data Defaults:

Initial Percent of Rate as DFR (%):	20
Dissipation Rate per day (%):	10

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	10
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Transfer Coefficients:

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	N/A	N/A	N/A
Low	300	140 to 290	Irrigation, scouting, thinning, weeding immature plants
Medium	1500	486 to 2760	Irrigation and scouting mature plants

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		CANCER RISK	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	0.561	0.561	0.0035	0.0173	3.5E-006	1.7E-005
1	0.505	0.505	0.0031	0.0156	3.1E-006	1.6E-005
2	0.454	0.454	0.0028	0.0140	2.8E-006	1.4E-005
3	0.409	0.409	0.0025	0.0126	2.5E-006	1.3E-005
4	0.368	0.368	0.0023	0.0114	2.3E-006	1.1E-005
5	0.331	0.331	0.0020	0.0102	2.0E-006	1.0E-005
6	0.298	0.298	0.0018	0.0092	1.8E-006	9.2E-006
7	0.268	0.268	0.0017	0.0083	1.7E-006	8.3E-006
8	0.241	0.241	0.0015	0.0075	1.5E-006	7.5E-006
9	0.217	0.217	0.0013	0.0067	1.3E-006	6.7E-006
10	0.196	0.196	0.0012	0.0060	1.2E-006	6.1E-006
11	0.176	0.176	0.0011	0.0054	1.1E-006	5.4E-006
12	0.158	0.158	0.0010	0.0049	9.8E-007	4.9E-006
13	0.143	0.143	0.0009	0.0044	8.8E-007	4.4E-006
14	0.128	0.128	0.0008	0.0040	7.9E-007	4.0E-006
15	0.115	0.115	0.0007	0.0036	7.1E-007	3.6E-006
16	0.104	0.104	0.0006	0.0032	6.4E-007	3.2E-006
17	0.094	0.094	0.0006	0.0029	5.8E-007	2.9E-006
18	0.084	0.084	0.0005	0.0026	5.2E-007	2.6E-006
19	0.076	0.076	0.0005	0.0023	4.7E-007	2.3E-006
20	0.068	0.068	0.0004	0.0021	4.2E-007	2.1E-006
21	0.061	0.061	0.0004	0.0019	3.8E-007	1.9E-006
22	0.055	0.055	0.0003	0.0017	3.4E-007	1.7E-006
23	0.050	0.050	0.0003	0.0015	3.1E-007	1.5E-006
24	0.045	0.045	0.0003	0.0014	2.8E-007	1.4E-006
25	0.040	0.040	0.0002	0.0012	2.5E-007	1.2E-006
26	0.036	0.036	0.0002	0.0011	2.2E-007	1.1E-006
27	0.033	0.033	0.0002	0.0010	2.0E-007	1.0E-006
28	0.029	0.029	0.0002	0.0009	1.8E-007	9.1E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Commercial Workers Using Default Inputs
Transfer Coefficient Group:	Conifer Seedlings
Specific Crop(s) Considered:	Conifer Seedlings
Application Rate of Crop (lb ai/A):	0.5

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	0
Source:	
Slope of Semilog Regression:	
[Initial] (ug/cm2):	
Study Application Rate (lb ai/A):	0.5
Limit of Quantification (ug/cm2):	

[Note: Enter application rate of crop if no data available in study rate cell.]

DFR Data Defaults:

Initial Percent of Rate as DFR (%):	20
Dissipation Rate per day (%):	10

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	30
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning

DAT	DFR LEVELS (ug/cm2)		Dose (mg/kg/day)	Cancer Risk
	Not Adjusted	Adjusted For Rate	Low Exposure	Low Exposure
0	1.122	1.122	0.0231	6.9E-005
1	1.010	1.010	0.0208	6.2E-005
2	0.909	0.909	0.0187	5.6E-005
3	0.818	0.818	0.0168	5.1E-005
4	0.736	0.736	0.0151	4.6E-005
5	0.662	0.662	0.0136	4.1E-005
6	0.596	0.596	0.0123	3.7E-005
7	0.537	0.537	0.0110	3.3E-005
8	0.483	0.483	0.0099	3.0E-005
9	0.435	0.435	0.0089	2.7E-005
10	0.391	0.391	0.0080	2.4E-005
11	0.352	0.352	0.0072	2.2E-005
12	0.317	0.317	0.0065	2.0E-005
13	0.285	0.285	0.0059	1.8E-005
14	0.257	0.257	0.0053	1.6E-005
15	0.231	0.231	0.0048	1.4E-005
16	0.208	0.208	0.0043	1.3E-005
17	0.187	0.187	0.0038	1.2E-005
18	0.168	0.168	0.0035	1.0E-005
19	0.152	0.152	0.0031	9.4E-006
20	0.136	0.136	0.0028	8.4E-006
21	0.123	0.123	0.0025	7.6E-006
22	0.110	0.110	0.0023	6.8E-006
23	0.099	0.099	0.0020	6.2E-006
24	0.089	0.089	0.0018	5.5E-006
25	0.081	0.081	0.0017	5.0E-006
26	0.072	0.072	0.0015	4.5E-006
27	0.065	0.065	0.0013	4.0E-006
28	0.059	0.059	0.0012	3.6E-006
29	0.053	0.053	0.0011	3.3E-006
30	0.048	0.048	0.0010	2.9E-006
31	0.043	0.043	0.0009	2.6E-006
32	0.039	0.039	0.0008	2.4E-006
33	0.035	0.035	0.0007	2.1E-006
34	0.031	0.031	0.0006	1.9E-006
35	0.028	0.028	0.0006	1.7E-006
36	0.025	0.025	0.0005	1.6E-006
37	0.023	0.023	0.0005	1.4E-006
38	0.020	0.020	0.0004	1.3E-006
39	0.018	0.018	0.0004	1.1E-006
40	0.017	0.017	0.0003	1.0E-006
41	0.015	0.015	0.0003	9.2E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Private Growers Using Default Inputs
Transfer Coefficient Group:	Conifer Seedlings
Specific Crop(s) Considered:	Conifer Seedlings
Application Rate of Crop (lb ai/A):	0.5

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	0
Source:	
Slope of Semilog Regression:	
[Initial] (ug/cm2):	
Study Application Rate (lb ai/A):	0.5
Limit of Quantification (ug/cm2):	

[Note: Enter application rate of crop if no data available in study rate cell.]

DFR Data Defaults:

Initial Percent of Rate as DFR (%):	20
Dissipation Rate per day (%):	10

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	10
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning

DAT	DFR LEVELS (ug/cm2)		Dose (mg/kg/day)	Cancer Risk
	Not Adjusted	Adjusted For Rate	Low Exposure	Low Exposure
0	1.122	1.122	0.0231	2.3E-005
1	1.010	1.010	0.0208	2.1E-005
2	0.909	0.909	0.0187	1.9E-005
3	0.818	0.818	0.0168	1.7E-005
4	0.736	0.736	0.0151	1.5E-005
5	0.662	0.662	0.0136	1.4E-005
6	0.596	0.596	0.0123	1.2E-005
7	0.537	0.537	0.0110	1.1E-005
8	0.483	0.483	0.0099	1.0E-005
9	0.435	0.435	0.0089	9.0E-006
10	0.391	0.391	0.0080	8.1E-006
11	0.352	0.352	0.0072	7.3E-006
12	0.317	0.317	0.0065	6.5E-006
13	0.285	0.285	0.0059	5.9E-006
14	0.257	0.257	0.0053	5.3E-006
15	0.231	0.231	0.0048	4.8E-006
16	0.208	0.208	0.0043	4.3E-006
17	0.187	0.187	0.0038	3.9E-006
18	0.168	0.168	0.0035	3.5E-006
19	0.152	0.152	0.0031	3.1E-006
20	0.136	0.136	0.0028	2.8E-006
21	0.123	0.123	0.0025	2.5E-006
22	0.110	0.110	0.0023	2.3E-006
23	0.099	0.099	0.0020	2.1E-006
24	0.089	0.089	0.0018	1.8E-006
25	0.081	0.081	0.0017	1.7E-006
26	0.072	0.072	0.0015	1.5E-006
27	0.065	0.065	0.0013	1.3E-006
28	0.059	0.059	0.0012	1.2E-006
29	0.053	0.053	0.0011	1.1E-006
30	0.048	0.048	0.0010	9.8E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Commercial Workers Using Default Inputs
Transfer Coefficient Group:	Conifers
Specific Crop(s) Considered:	Christmas Trees
Application Rate of Crop (lb ai/A):	1

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	0
Source:	N/A
Slope of Semilog Regression:	N/A
[Initial] (ug/cm2):	N/A
Study Application Rate (lb ai/A):	1
Limit of Quantification (ug/cm2):	N/A

[Note: Enter application rate of crop if no data available in study rate cell.]

DFR Data Defaults:

Initial Percent of Rate as DFR (%):	20
Dissipation Rate per day (%):	10

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	30
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		Cancer Risk	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	2.244	2.244	0.0462	0.1385	1.4E-004	4.2E-004
1	2.019	2.019	0.0415	0.1246	1.2E-004	3.7E-004
2	1.817	1.817	0.0374	0.1122	1.1E-004	3.4E-004
3	1.636	1.636	0.0336	0.1009	1.0E-004	3.0E-004
4	1.472	1.472	0.0303	0.0909	9.1E-005	2.7E-004
5	1.325	1.325	0.0273	0.0818	8.2E-005	2.5E-004
6	1.192	1.192	0.0245	0.0736	7.4E-005	2.2E-004
7	1.073	1.073	0.0221	0.0662	6.6E-005	2.0E-004
8	0.966	0.966	0.0199	0.0596	6.0E-005	1.8E-004
9	0.869	0.869	0.0179	0.0536	5.4E-005	1.6E-004
10	0.782	0.782	0.0161	0.0483	4.8E-005	1.5E-004
11	0.704	0.704	0.0145	0.0435	4.4E-005	1.3E-004
12	0.634	0.634	0.0130	0.0391	3.9E-005	1.2E-004
13	0.570	0.570	0.0117	0.0352	3.5E-005	1.1E-004
14	0.513	0.513	0.0106	0.0317	3.2E-005	9.5E-005
15	0.462	0.462	0.0095	0.0285	2.9E-005	8.6E-005
16	0.416	0.416	0.0086	0.0257	2.6E-005	7.7E-005
17	0.374	0.374	0.0077	0.0231	2.3E-005	6.9E-005
18	0.337	0.337	0.0069	0.0208	2.1E-005	6.3E-005
19	0.303	0.303	0.0062	0.0187	1.9E-005	5.6E-005
20	0.273	0.273	0.0056	0.0168	1.7E-005	5.1E-005
21	0.246	0.246	0.0051	0.0152	1.5E-005	4.6E-005
22	0.221	0.221	0.0045	0.0136	1.4E-005	4.1E-005
23	0.199	0.199	0.0041	0.0123	1.2E-005	3.7E-005
24	0.179	0.179	0.0037	0.0110	1.1E-005	3.3E-005
25	0.161	0.161	0.0033	0.0099	1.0E-005	3.0E-005
26	0.145	0.145	0.0030	0.0089	9.0E-006	2.7E-005
27	0.130	0.130	0.0027	0.0081	8.1E-006	2.4E-005
28	0.117	0.117	0.0024	0.0072	7.3E-006	2.2E-005
29	0.106	0.106	0.0022	0.0065	6.5E-006	2.0E-005
30	0.095	0.095	0.0020	0.0059	5.9E-006	1.8E-005
31	0.086	0.086	0.0018	0.0053	5.3E-006	1.6E-005
32	0.077	0.077	0.0016	0.0048	4.8E-006	1.4E-005
33	0.069	0.069	0.0014	0.0043	4.3E-006	1.3E-005
34	0.062	0.062	0.0013	0.0039	3.9E-006	1.2E-005
35	0.056	0.056	0.0012	0.0035	3.5E-006	1.0E-005
36	0.051	0.051	0.0010	0.0031	3.1E-006	9.4E-006
37	0.045	0.045	0.0009	0.0028	2.8E-006	8.4E-006
38	0.041	0.041	0.0008	0.0025	2.5E-006	7.6E-006
39	0.037	0.037	0.0008	0.0023	2.3E-006	6.8E-006
40	0.033	0.033	0.0007	0.0020	2.1E-006	6.2E-006
41	0.030	0.030	0.0006	0.0018	1.8E-006	5.5E-006
42	0.027	0.027	0.0006	0.0017	1.7E-006	5.0E-006
43	0.024	0.024	0.0005	0.0015	1.5E-006	4.5E-006
44	0.022	0.022	0.0004	0.0013	1.3E-006	4.0E-006
45	0.020	0.020	0.0004	0.0012	1.2E-006	3.6E-006
46	0.018	0.018	0.0004	0.0011	1.1E-006	3.3E-006
47	0.016	0.016	0.0003	0.0010	9.8E-007	2.9E-006
48	0.014	0.014	0.0003	0.0009	8.8E-007	2.7E-006
49	0.013	0.013	0.0003	0.0008	8.0E-007	2.4E-006
50	0.012	0.012	0.0002	0.0007	7.2E-007	2.1E-006
51	0.010	0.010	0.0002	0.0006	6.4E-007	1.9E-006
52	0.009	0.009	0.0002	0.0006	5.8E-007	1.7E-006
53	0.008	0.008	0.0002	0.0005	5.2E-007	1.6E-006
54	0.008	0.008	0.0002	0.0005	4.7E-007	1.4E-006
55	0.007	0.007	0.0001	0.0004	4.2E-007	1.3E-006
56	0.006	0.006	0.0001	0.0004	3.8E-007	1.1E-006
57	0.006	0.006	0.0001	0.0003	3.4E-007	1.0E-006
58	0.005	0.005	0.0001	0.0003	3.1E-007	9.2E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Private Growers Using Default Inputs
Transfer Coefficient Group:	Conifers
Specific Crop(s) Considered:	Christmas Trees
Application Rate of Crop (lb ai/A):	1

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	0
Source:	N/A
Slope of Semilog Regression:	N/A
[Initial] (ug/cm2):	N/A
Study Application Rate (lb ai/A):	1
Limit of Quantification (ug/cm2):	N/A

[Note: Enter application rate of crop if no data available in study rate cell.]

DFR Data Defaults:

Initial Percent of Rate as DFR (%):	20
Dissipation Rate per day (%):	10

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	10
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		Cancer Risk	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	2.244	2.244	0.0462	0.1385	4.6E-005	1.4E-004
1	2.019	2.019	0.0415	0.1246	4.2E-005	1.2E-004
2	1.817	1.817	0.0374	0.1122	3.7E-005	1.1E-004
3	1.636	1.636	0.0336	0.1009	3.4E-005	1.0E-004
4	1.472	1.472	0.0303	0.0909	3.0E-005	9.1E-005
5	1.325	1.325	0.0273	0.0818	2.7E-005	8.2E-005
6	1.192	1.192	0.0245	0.0736	2.5E-005	7.4E-005
7	1.073	1.073	0.0221	0.0662	2.2E-005	6.6E-005
8	0.966	0.966	0.0199	0.0596	2.0E-005	6.0E-005
9	0.869	0.869	0.0179	0.0536	1.8E-005	5.4E-005
10	0.782	0.782	0.0161	0.0483	1.6E-005	4.8E-005
11	0.704	0.704	0.0145	0.0435	1.5E-005	4.4E-005
12	0.634	0.634	0.0130	0.0391	1.3E-005	3.9E-005
13	0.570	0.570	0.0117	0.0352	1.2E-005	3.5E-005
14	0.513	0.513	0.0106	0.0317	1.1E-005	3.2E-005
15	0.462	0.462	0.0095	0.0285	9.5E-006	2.9E-005
16	0.416	0.416	0.0086	0.0257	8.6E-006	2.6E-005
17	0.374	0.374	0.0077	0.0231	7.7E-006	2.3E-005
18	0.337	0.337	0.0069	0.0208	6.9E-006	2.1E-005
19	0.303	0.303	0.0062	0.0187	6.3E-006	1.9E-005
20	0.273	0.273	0.0056	0.0168	5.6E-006	1.7E-005
21	0.246	0.246	0.0051	0.0152	5.1E-006	1.5E-005
22	0.221	0.221	0.0045	0.0136	4.6E-006	1.4E-005
23	0.199	0.199	0.0041	0.0123	4.1E-006	1.2E-005
24	0.179	0.179	0.0037	0.0110	3.7E-006	1.1E-005
25	0.161	0.161	0.0033	0.0099	3.3E-006	1.0E-005
26	0.145	0.145	0.0030	0.0089	3.0E-006	9.0E-006
27	0.130	0.130	0.0027	0.0081	2.7E-006	8.1E-006
28	0.117	0.117	0.0024	0.0072	2.4E-006	7.3E-006
29	0.106	0.106	0.0022	0.0065	2.2E-006	6.5E-006
30	0.095	0.095	0.0020	0.0059	2.0E-006	5.9E-006
31	0.086	0.086	0.0018	0.0053	1.8E-006	5.3E-006
32	0.077	0.077	0.0016	0.0048	1.6E-006	4.8E-006
33	0.069	0.069	0.0014	0.0043	1.4E-006	4.3E-006
34	0.062	0.062	0.0013	0.0039	1.3E-006	3.9E-006
35	0.056	0.056	0.0012	0.0035	1.2E-006	3.5E-006
36	0.051	0.051	0.0010	0.0031	1.0E-006	3.1E-006
37	0.045	0.045	0.0009	0.0028	9.4E-007	2.8E-006
38	0.041	0.041	0.0008	0.0025	8.4E-007	2.5E-006
39	0.037	0.037	0.0008	0.0023	7.6E-007	2.3E-006
40	0.033	0.033	0.0007	0.0020	6.8E-007	2.1E-006
41	0.030	0.030	0.0006	0.0018	6.2E-007	1.8E-006
42	0.027	0.027	0.0006	0.0017	5.5E-007	1.7E-006
43	0.024	0.024	0.0005	0.0015	5.0E-007	1.5E-006
44	0.022	0.022	0.0004	0.0013	4.5E-007	1.3E-006
45	0.020	0.020	0.0004	0.0012	4.0E-007	1.2E-006
46	0.018	0.018	0.0004	0.0011	3.6E-007	1.1E-006
47	0.016	0.016	0.0003	0.0010	3.3E-007	9.8E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Commercial Workers Using Default Inputs
Transfer Coefficient Group:	Conifers
Specific Crop(s) Considered:	Christmas Trees Using Lower Rate for Chemical Mowing
Application Rate of Crop (lb ai/A):	0.375

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	0
Source:	N/A
Slope of Semilog Regression:	N/A
[Initial] (ug/cm2):	N/A
Study Application Rate (lb ai/A):	0.375
Limit of Quantification (ug/cm2):	N/A

[Note: Enter application rate of crop if no data available in study rate cell.]

DFR Data Defaults:

Initial Percent of Rate as DFR (%):	20
Dissipation Rate per day (%):	10

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	30
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		Cancer Risk	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	0.841	0.841	0.0173	0.0519	5.2E-005	1.6E-004
1	0.757	0.757	0.0156	0.0467	4.7E-005	1.4E-004
2	0.682	0.682	0.0140	0.0421	4.2E-005	1.3E-004
3	0.613	0.613	0.0126	0.0379	3.8E-005	1.1E-004
4	0.552	0.552	0.0114	0.0341	3.4E-005	1.0E-004
5	0.497	0.497	0.0102	0.0307	3.1E-005	9.2E-005
6	0.447	0.447	0.0092	0.0276	2.8E-005	8.3E-005
7	0.402	0.402	0.0083	0.0248	2.5E-005	7.5E-005
8	0.362	0.362	0.0075	0.0224	2.2E-005	6.7E-005
9	0.326	0.326	0.0067	0.0201	2.0E-005	6.1E-005
10	0.293	0.293	0.0060	0.0181	1.8E-005	5.4E-005
11	0.264	0.264	0.0054	0.0163	1.6E-005	4.9E-005
12	0.238	0.238	0.0049	0.0147	1.5E-005	4.4E-005
13	0.214	0.214	0.0044	0.0132	1.3E-005	4.0E-005
14	0.192	0.192	0.0040	0.0119	1.2E-005	3.6E-005
15	0.173	0.173	0.0036	0.0107	1.1E-005	3.2E-005
16	0.156	0.156	0.0032	0.0096	9.6E-006	2.9E-005
17	0.140	0.140	0.0029	0.0087	8.7E-006	2.6E-005
18	0.126	0.126	0.0026	0.0078	7.8E-006	2.3E-005
19	0.114	0.114	0.0023	0.0070	7.0E-006	2.1E-005
20	0.102	0.102	0.0021	0.0063	6.3E-006	1.9E-005
21	0.092	0.092	0.0019	0.0057	5.7E-006	1.7E-005
22	0.083	0.083	0.0017	0.0051	5.1E-006	1.5E-005
23	0.075	0.075	0.0015	0.0046	4.6E-006	1.4E-005
24	0.067	0.067	0.0014	0.0041	4.2E-006	1.2E-005
25	0.060	0.060	0.0012	0.0037	3.7E-006	1.1E-005
26	0.054	0.054	0.0011	0.0034	3.4E-006	1.0E-005
27	0.049	0.049	0.0010	0.0030	3.0E-006	9.1E-006
28	0.044	0.044	0.0009	0.0027	2.7E-006	8.2E-006
29	0.040	0.040	0.0008	0.0024	2.5E-006	7.4E-006
30	0.036	0.036	0.0007	0.0022	2.2E-006	6.6E-006
31	0.032	0.032	0.0007	0.0020	2.0E-006	6.0E-006
32	0.029	0.029	0.0006	0.0018	1.8E-006	5.4E-006
33	0.026	0.026	0.0005	0.0016	1.6E-006	4.8E-006
34	0.023	0.023	0.0005	0.0014	1.4E-006	4.3E-006
35	0.021	0.021	0.0004	0.0013	1.3E-006	3.9E-006
36	0.019	0.019	0.0004	0.0012	1.2E-006	3.5E-006
37	0.017	0.017	0.0004	0.0011	1.1E-006	3.2E-006
38	0.015	0.015	0.0003	0.0009	9.5E-007	2.9E-006
39	0.014	0.014	0.0003	0.0009	8.6E-007	2.6E-006
40	0.012	0.012	0.0003	0.0008	7.7E-007	2.3E-006
41	0.011	0.011	0.0002	0.0007	6.9E-007	2.1E-006
42	0.010	0.010	0.0002	0.0006	6.2E-007	1.9E-006
43	0.009	0.009	0.0002	0.0006	5.6E-007	1.7E-006
44	0.008	0.008	0.0002	0.0005	5.0E-007	1.5E-006
45	0.007	0.007	0.0002	0.0005	4.5E-007	1.4E-006
46	0.007	0.007	0.0001	0.0004	4.1E-007	1.2E-006
47	0.006	0.006	0.0001	0.0004	3.7E-007	1.1E-006
48	0.005	0.005	0.0001	0.0003	3.3E-007	9.9E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Private Growers Using Default Inputs
Transfer Coefficient Group:	Conifers
Specific Crop(s) Considered:	Christmas Trees Using Lower Rate for Chemical Mowing
Application Rate of Crop (lb ai/A):	0.375

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	0
Source:	N/A
Slope of Semilog Regression:	N/A
[Initial] (ug/cm2):	N/A
Study Application Rate (lb ai/A):	0.375
Limit of Quantification (ug/cm2):	N/A

[Note: Enter application rate of crop if no data available in study rate cell.]

DFR Data Defaults:

Initial Percent of Rate as DFR (%):	20
Dissipation Rate per day (%):	10

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	10
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	Shearing, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		Cancer Risk	
	Not Adjusted	Adjusted For Rate	Low Exposure	Medium Exposure	Low Exposure	Medium Exposure
0	0.841	0.841	0.0173	0.0519	1.7E-005	5.2E-005
1	0.757	0.757	0.0156	0.0467	1.6E-005	4.7E-005
2	0.682	0.682	0.0140	0.0421	1.4E-005	4.2E-005
3	0.613	0.613	0.0126	0.0379	1.3E-005	3.8E-005
4	0.552	0.552	0.0114	0.0341	1.1E-005	3.4E-005
5	0.497	0.497	0.0102	0.0307	1.0E-005	3.1E-005
6	0.447	0.447	0.0092	0.0276	9.2E-006	2.8E-005
7	0.402	0.402	0.0083	0.0248	8.3E-006	2.5E-005
8	0.362	0.362	0.0075	0.0224	7.5E-006	2.2E-005
9	0.326	0.326	0.0067	0.0201	6.7E-006	2.0E-005
10	0.293	0.293	0.0060	0.0181	6.1E-006	1.8E-005
11	0.264	0.264	0.0054	0.0163	5.4E-006	1.6E-005
12	0.238	0.238	0.0049	0.0147	4.9E-006	1.5E-005
13	0.214	0.214	0.0044	0.0132	4.4E-006	1.3E-005
14	0.192	0.192	0.0040	0.0119	4.0E-006	1.2E-005
15	0.173	0.173	0.0036	0.0107	3.6E-006	1.1E-005
16	0.156	0.156	0.0032	0.0096	3.2E-006	9.6E-006
17	0.140	0.140	0.0029	0.0087	2.9E-006	8.7E-006
18	0.126	0.126	0.0026	0.0078	2.6E-006	7.8E-006
19	0.114	0.114	0.0023	0.0070	2.3E-006	7.0E-006
20	0.102	0.102	0.0021	0.0063	2.1E-006	6.3E-006
21	0.092	0.092	0.0019	0.0057	1.9E-006	5.7E-006
22	0.083	0.083	0.0017	0.0051	1.7E-006	5.1E-006
23	0.075	0.075	0.0015	0.0046	1.5E-006	4.6E-006
24	0.067	0.067	0.0014	0.0041	1.4E-006	4.1E-006
25	0.060	0.060	0.0012	0.0037	1.2E-006	3.7E-006
26	0.054	0.054	0.0011	0.0034	1.1E-006	3.4E-006
27	0.049	0.049	0.0010	0.0030	1.0E-006	3.0E-006
28	0.044	0.044	0.0009	0.0027	9.1E-007	2.7E-006
29	0.040	0.040	0.0008	0.0024	8.2E-007	2.4E-006
30	0.036	0.036	0.0007	0.0022	7.4E-007	2.2E-006
31	0.032	0.032	0.0007	0.0020	6.6E-007	2.0E-006
32	0.029	0.029	0.0006	0.0018	6.0E-007	1.8E-006
33	0.026	0.026	0.0005	0.0016	5.4E-007	1.6E-006
34	0.023	0.023	0.0005	0.0014	4.8E-007	1.4E-006
35	0.021	0.021	0.0004	0.0013	4.3E-007	1.3E-006
36	0.019	0.019	0.0004	0.0012	3.9E-007	1.2E-006
37	0.017	0.017	0.0004	0.0011	3.5E-007	1.1E-006
38	0.015	0.015	0.0003	0.0009	3.2E-007	9.5E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Conifers Using DFR Data (Commercial Worker)
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Seedlings
Application Rate of Crop (lb ai/A):	0.5

DFR Data Summary

Data Source (enter 1 if data available):	1
Source:	MRID 420983-01
Slope of Semilog Regression:	-0.47
[Initial] (ug/cm2):	1
Day 1 DFR (ug/cm2):	0.10
Study Application Rate (lb ai/A):	0.13
Limit of Detection (ug/cm2):	0.01

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	30
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Transfer Coefficient

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	100	100	propping
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)		Cancer Risk	
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Low Exposure	Very Low Exposure	Low Exposure
0	1.000	3.846	7.9E-003	7.9E-002	2.4E-005	2.4E-004
1	0.100	0.385	7.9E-004	7.9E-003	2.4E-006	2.4E-005
2	0.0625	0.240	4.9E-004	4.9E-003	1.5E-006	1.5E-005
3	0.0391	0.150	3.1E-004	3.1E-003	9.3E-007	9.3E-006
4	0.0244	0.094	1.9E-004	1.9E-003	5.8E-007	5.8E-006
5	0.0153	0.059	1.2E-004	1.2E-003	3.6E-007	3.6E-006
6	0.0095	0.037	7.5E-005	7.5E-004	2.3E-007	2.3E-006
7	0.0060	0.023	4.7E-005	4.7E-004	1.4E-007	1.4E-006
8	0.0037	0.014	2.9E-005	2.9E-004	8.9E-008	8.9E-007
9	0.0023	0.009	1.8E-005	1.8E-004	5.5E-008	5.5E-007
10	0.0015	0.006	1.2E-005	1.2E-004	3.5E-008	3.5E-007
11	0.0009	0.003	7.2E-006	7.2E-005	2.2E-008	2.2E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Conifers Using DFR Data (Private Growers)
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Seedlings
Application Rate of Crop (lb ai/A):	0.5

DFR Data Summary

Data Source (enter 1 if data available):	1
Source:	MRID 420983-01
Slope of Semilog Regression:	-0.47
[Initial] (ug/cm2):	1
Day 1 DFR (ug/cm2):	0.10
Study Application Rate (lb ai/A):	0.13
Limit of Detection (ug/cm2):	0.01

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	10
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Transfer Coefficient

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	100	100	propping
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,

DAT	DFR LEVELS (ug/cm2)		DOSE mg/kg/day		Cancer Risk	
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Low Exposure	Very Low Exposure	Low Exposure
0	1.000	3.846	7.9E-003	7.9E-002	7.9E-006	7.9E-005
1	0.100	0.385	7.9E-004	7.9E-003	7.9E-007	7.9E-006
2	0.0625	0.240	4.9E-004	4.9E-003	5.0E-007	5.0E-006
3	0.0391	0.150	3.1E-004	3.1E-003	3.1E-007	3.1E-006
4	0.0244	0.094	1.9E-004	1.9E-003	1.9E-007	1.9E-006
5	0.0153	0.059	1.2E-004	1.2E-003	1.2E-007	1.2E-006
6	0.0095	0.037	7.5E-005	7.5E-004	7.6E-008	7.6E-007
7	0.0060	0.023	4.7E-005	4.7E-004	4.7E-008	4.7E-007
8	0.0037	0.014	2.9E-005	2.9E-004	3.0E-008	3.0E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Conifers Using DFR Data (Commercial Worker)
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Trees
Application Rate of Crop (lb ai/A):	1

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	1
Source:	MRID 420983-01
Slope of Semilog Regression:	-0.47
[Initial] (ug/cm2):	1
Day 1 DFR (ug/cm2)	0.1
Study Application Rate (lb ai/A):	0.13
Limit of Detection (ug/cm2):	0.01

[Note: Enter application rate of crop if no data available in study rate cell.]

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	30
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	100	100	propping
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	harvesting, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)			Cancer Risk		
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Low Exposure	Medium Exposure	Very Low Exposure	Low Exposure	Medium Exposure
0	1.000	7.692	1.6E-002	1.6E-001	4.7E-001	4.8E-005	4.8E-004	1.4E-003
1	0.100	0.769	1.6E-003	1.6E-002	4.7E-002	4.8E-006	4.8E-005	1.4E-004
2	0.0625	0.481	9.9E-004	9.9E-003	3.0E-002	3.0E-006	3.0E-005	8.9E-005
3	0.0391	0.300	6.2E-004	6.2E-003	1.9E-002	1.9E-006	1.9E-005	5.6E-005
4	0.0244	0.188	3.9E-004	3.9E-003	1.2E-002	1.2E-006	1.2E-005	3.5E-005
5	0.0153	0.117	2.4E-004	2.4E-003	7.2E-003	7.3E-007	7.3E-006	2.2E-005
6	0.0095	0.073	1.5E-004	1.5E-003	4.5E-003	4.5E-007	4.5E-006	1.4E-005
7	0.0060	0.046	9.4E-005	9.4E-004	2.8E-003	2.8E-007	2.8E-006	8.5E-006
8	0.0037	0.029	5.9E-005	5.9E-004	1.8E-003	1.8E-007	1.8E-006	5.3E-006
9	0.0023	0.018	3.7E-005	3.7E-004	1.1E-003	1.1E-007	1.1E-006	3.3E-006
10	0.0015	0.011	2.3E-005	2.3E-004	6.9E-004	6.9E-008	6.9E-007	2.1E-006
11	0.0009	0.007	1.4E-005	1.4E-004	4.3E-004	4.3E-008	4.3E-007	1.3E-006
12	0.0006	0.004	9.0E-006	9.0E-005	2.7E-004	2.7E-008	2.7E-007	8.1E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Conifers Using DFR Data (Commercial Worker)
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Trees
Application Rate of Crop (lb ai/A):	1

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	1
Source:	MRID 420983-01
Slope of Semilog Regression:	-0.47
[Initial] (ug/cm2):	1
Day 1 DFR (ug/cm2)	0.1
Study Application Rate (lb ai/A):	0.13
Limit of Detection (ug/cm2):	0.01

[Note: Enter application rate of crop if no data available in study rate cell.]

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	10
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	100	100	propping
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	harvesting, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)			Cancer Risk		
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Low Exposure	Medium Exposure	Very Low Exposure	Low Exposure	Medium Exposure
0	1.000	7.692	1.6E-002	1.6E-001	4.7E-001	1.6E-005	1.6E-004	4.8E-004
1	0.100	0.769	1.6E-003	1.6E-002	4.7E-002	1.6E-006	1.6E-005	4.8E-005
2	0.0625	0.481	9.9E-004	9.9E-003	3.0E-002	9.9E-007	9.9E-006	3.0E-005
3	0.0391	0.300	6.2E-004	6.2E-003	1.9E-002	6.2E-007	6.2E-006	1.9E-005
4	0.0244	0.188	3.9E-004	3.9E-003	1.2E-002	3.9E-007	3.9E-006	1.2E-005
5	0.0153	0.117	2.4E-004	2.4E-003	7.2E-003	2.4E-007	2.4E-006	7.3E-006
6	0.0095	0.073	1.5E-004	1.5E-003	4.5E-003	1.5E-007	1.5E-006	4.5E-006
7	0.0060	0.046	9.4E-005	9.4E-004	2.8E-003	9.5E-008	9.5E-007	2.8E-006
8	0.0037	0.029	5.9E-005	5.9E-004	1.8E-003	5.9E-008	5.9E-007	1.8E-006
9	0.0023	0.018	3.7E-005	3.7E-004	1.1E-003	3.7E-008	3.7E-007	1.1E-006
10	0.0015	0.011	2.3E-005	2.3E-004	6.9E-004	2.3E-008	2.3E-007	6.9E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Conifers Using DFR Data (Commercial Worker)
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Trees Using Lower Rate for Chemical Mowing
Application Rate of Crop (lb ai/A):	0.375

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	1
Source:	MRID 420983-01
Slope of Semilog Regression:	-0.47
[Initial] (ug/cm2):	1
Day 1 DFR (ug/cm2)	0.1
Study Application Rate (lb ai/A):	0.13
Limit of Detection (ug/cm2):	0.01

[Note: Enter application rate of crop if no data available in study rate cell.]

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	30
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	100	100	propping
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	harvesting, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)			Cancer Risk		
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Low Exposure	Medium Exposure	Very Low Exposure	Low Exposure	Medium Exposure
0	1.000	2.885	5.9E-003	5.9E-002	1.8E-001	1.8E-005	1.8E-004	5.4E-004
1	0.100	0.288	5.9E-004	5.9E-003	1.8E-002	1.8E-006	1.8E-005	5.4E-005
2	0.0625	0.180	3.7E-004	3.7E-003	1.1E-002	1.1E-006	1.1E-005	3.3E-005
3	0.0391	0.113	2.3E-004	2.3E-003	7.0E-003	7.0E-007	7.0E-006	2.1E-005
4	0.0244	0.070	1.4E-004	1.4E-003	4.3E-003	4.4E-007	4.4E-006	1.3E-005
5	0.0153	0.044	9.1E-005	9.1E-004	2.7E-003	2.7E-007	2.7E-006	8.2E-006
6	0.0095	0.028	5.7E-005	5.7E-004	1.7E-003	1.7E-007	1.7E-006	5.1E-006
7	0.0060	0.017	3.5E-005	3.5E-004	1.1E-003	1.1E-007	1.1E-006	3.2E-006
8	0.0037	0.011	2.2E-005	2.2E-004	6.6E-004	6.7E-008	6.7E-007	2.0E-006
9	0.0023	0.007	1.4E-005	1.4E-004	4.1E-004	4.2E-008	4.2E-007	1.2E-006
10	0.0015	0.004	8.6E-006	8.6E-005	2.6E-004	2.6E-008	2.6E-007	7.8E-007
11	0.0009	0.003	5.4E-006	5.4E-005	1.6E-004	1.6E-008	1.6E-007	4.9E-007
12	0.0006	0.002	3.4E-006	3.4E-005	1.0E-004	1.0E-008	1.0E-007	3.0E-007

Occupational Post-Application Risk Assessment Calculator Version 1 (8/9/00)

Chemical:	Oxyfluorfen
Reason:	Cancer Risk for Conifers Using DFR Data (Private Grower)
Transfer Coefficient Group:	Evergreen Tree Fruit
Specific Crop(s) Considered:	Conifer Trees Using Lower Rate for Chemical Mowing
Application Rate of Crop (lb ai/A):	0.375

DFR Data Summary

Data Source (enter 1 if data available, 0 if defaults):	1
Source:	MRID 420983-01
Slope of Semilog Regression:	-0.47
[Initial] (ug/cm2):	1
Day 1 DFR (ug/cm2)	0.1
Study Application Rate (lb ai/A):	0.13
Limit of Detection (ug/cm2):	0.01

[Note: Enter application rate of crop if no data available in study rate cell.]

Toxicology & Exposure Factor Inputs:

Q Star	0.0732
Years of Exposure Per Life Time	35
Days of Exposure per year	10
Adult Exposure Duration (hrs/day):	8
Adult Body Weight (kg):	70
Dermal Abs. (%):	18

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hour)		Activities
	Used For RA	Range	
Very Low	100	100	propping
Low	1000	197 to 2302	Irrigation, scouting, hand weeding, thinning Christmas trees,
Medium	3000	1121 to 4929	harvesting, pruning, training, tying, thinning, cone pruning,

DAT	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day)			Cancer Risk		
	Not Adjusted	Adjusted For Rate	Very Low Exposure	Low Exposure	Medium Exposure	Very Low Exposure	Low Exposure	Medium Exposure
0	1.000	2.885	5.9E-003	5.9E-002	1.8E-001	6.0E-006	6.0E-005	1.8E-004
1	0.100	0.288	5.9E-004	5.9E-003	1.8E-002	6.0E-007	6.0E-006	1.8E-005
2	0.0625	0.180	3.7E-004	3.7E-003	1.1E-002	3.7E-007	3.7E-006	1.1E-005
3	0.0391	0.113	2.3E-004	2.3E-003	7.0E-003	2.3E-007	2.3E-006	7.0E-006
4	0.0244	0.070	1.4E-004	1.4E-003	4.3E-003	1.5E-007	1.5E-006	4.4E-006
5	0.0153	0.044	9.1E-005	9.1E-004	2.7E-003	9.1E-008	9.1E-007	2.7E-006
6	0.0095	0.028	5.7E-005	5.7E-004	1.7E-003	5.7E-008	5.7E-007	1.7E-006
7	0.0060	0.017	3.5E-005	3.5E-004	1.1E-003	3.5E-008	3.5E-007	1.1E-006
8	0.0037	0.011	2.2E-005	2.2E-004	6.6E-004	2.2E-008	2.2E-007	6.7E-007
9	0.0023	0.007	1.4E-005	1.4E-004	4.1E-004	1.4E-008	1.4E-007	4.2E-007
10	0.0015	0.004	8.6E-006	8.6E-005	2.6E-004	8.7E-009	8.7E-008	2.6E-007
11	0.0009	0.003	5.4E-006	5.4E-005	1.6E-004	5.4E-009	5.4E-008	1.6E-007
12	0.0006	0.002	3.4E-006	3.4E-005	1.0E-004	3.4E-009	3.4E-008	1.0E-007